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Rouge

Duffin

Highland

Petticoat

CONSERVATION REPORT
1956

DEPARTMENT OF PLANNING AND DEVELOPMENT

GOVT PUBNS

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Fourteen per cent of the Little Rouge Valley is Class I agricultural land. This land does not require special conservation practices or restrictions in use to maintain its productivity. The remainder of the land requires some or all the practices recommended in this report.

DEPARTMENT OF PLANNING AND DEVELOPMENT

HON. W. M. NICKLE, Q.C.
Minister

T. A. C. TYRRELL
Deputy Minister

A. H. RICHARDSON
Chief Conservation Engineer

R.D.H.P.
VALLEY
CONSERVATION
REPORT
1956



TORONTO

1956

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One hundred and eighty copies of
this report have been prepared,
of which this is

Number 59

Honourable W. M. Nickle, Minister,
Department of Planning and Development,
Parliament Buildings,
Toronto, Ontario.

Honourable Sir:

I take pleasure in transmitting
herewith the complete Conservation Report for the
Rouge River, Duffin, Highland and Petticoat Creeks.

The report covers History, Land,
Forestry, Water, Recreation and Wildlife.

Yours very truly,

A. H. Richardson,
Chief Conservation Engineer

Toronto, November 26, 1956

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INTRODUCTION

Conservation has long been a subject of concern to the people of Ontario. This concern had to do originally with the protection of forests because of their importance as a source of revenue to the Province; but allied with this was the problem of wildlife management and the protection of source areas of rivers and streams. In Southern Ontario interest in conservation was indicated first by reforestation and woodlot management, but more recently this has broadened out to include flood and pollution control, improved land use and provision for recreation facilities.

While the progress in these activities has been steady up to the present, most of the programs heretofore were initiated by government departments. Recently, however, there has been a growing conception of personal obligation, especially where land use problems, farm ponds and small reforestation projects are concerned. On the other hand, control of flooding, summer flow and pollution; large reforestation projects; and recreation areas have come to be considered the responsibility of the community - the community in this case being the river valley.

With the advent of this new concept of personal and community responsibility in conservation, the Authorities movement was born, and the willingness of our people to undertake conservation in this way is indicated by the fact that in the last ten years 19 Authorities have been established, with a total membership of 287 municipalities and an area of 12,013 square miles.

The first step in establishing a Conservation Authority is undertaken by all the municipalities wholly or partly within a watershed. Two such municipalities must first by resolution petition the government to call a meeting for the purpose of ascertaining whether or not an Authority should be established. Two-thirds of the number of representatives which the municipalities are entitled to appoint

(on a population basis) must be present to make the meeting legal. If two-thirds of those present vote in favour of establishing an Authority a resolution is forwarded to the Government. The Authority is then established by Order-in-Council and under the Act becomes a body corporate, including representatives from all the municipalities in the watershed.

While some Authorities were brought into being because of flooding within their areas, all were aware of the necessity of carrying out such supplementary measures as improved methods of land use, reforestation, proper woodlot management, prevention of pollution, investigation of underground water supplies, wildlife studies and recreation. But the Authorities were not equipped to carry out the extensive investigations that would indicate where such work should be done. Consequently the Conservation Branch of the Department of Planning and Development undertook to carry out the preliminary investigations as a service to the Authorities, to appraise, by means of surveys and reports, the conservation needs of each watershed, and to submit to the Authority a detailed report outlining the conservation measures that should be implemented.

The survey work is grouped under five general headings, namely, Land Use, Forestry, Water, Wildlife and Recreation. The scope of the studies made in each of these subjects varies with the condition and needs of the area under investigation. In addition to the five topics indicated above, a study of the history of the area is incorporated. This serves as a backdrop to all the conservation problems of the watershed and compels the reader to understand the abuses of the past and the need for a diversified program in the future.

The starting point for all surveys is aerial photography. Before the survey is commenced in the field all such contributing data as maps, old records, photographs, unpublished reports and other useful information are thoroughly

explored and recorded. While the survey is in progress similar data are gathered locally, and agricultural representatives, zone foresters, municipal clerks and other officials and private citizens are interviewed for additional material.

The results of these conservation surveys, together with the recommendations based upon them, are set down in the reports presented to the Authorities and intended to serve them as a blueprint. The carrying out of any scheme is not the work of the Conservation Branch of the Department of Planning and Development, because it is not an operating department. Its active participation for the most part ceases when the planning is complete and the report is submitted, although it stands by to interpret the report and give advice and assistance in carrying out the plans recommended in the report. The Authority must assume responsibility for initiating the schemes which it considers most urgent; it must also make approaches to the government departments or other bodies from which it hopes to get assistance.

If, for example, an Authority undertakes a scheme having to do with land use, it must seek assistance from the Department of Agriculture; if it involves a forestry or wildlife problem, then the Department of Lands and Forests is approached. In the case of flood control, however, as there is no department of the Government doing hydraulic surveys except the Conservation Branch, whose staff is not large enough to carry through the engineering works of several Authorities, the Authority must engage a consulting engineer to do the final engineering and designing and to carry the work through the construction stage. Similarly, where an Authority undertakes a scheme which has to do with recreation, it may have to employ men specially trained in this work.

As the work being done by Authorities is a new approach to the conservation problem, in that the responsibility

of carrying it out is left entirely in the hands of the Authority concerned, much directing and assistance have been necessary from the Conservation Branch and, in the case of 15 Authorities, a member of the staff of the Department of Planning and Development has been assigned to work in the watershed.

The R.D.H.P. Conservation Authority was established by Order-in-Council on April 1, 1954, following an organization meeting which was held at Markham on March 10, 1954, when 14 representatives out of a total of 16 attended the meeting and 13 voted in favour of establishing the Authority. The Authority's jurisdiction actually extends over four small valleys, from the west boundary of the Highland Creek Watershed to the east boundary of Duffin Creek Watershed.

As mentioned above, the Department of Planning and Development, as a service to an Authority, undertakes to carry out a conservation survey of the valley for the guidance of the Authority, but the commencement of conservation work in the valley does not necessarily have to wait until such a survey has been made and the report presented. This has been the case with the R.D.H.P. Conservation Authority, and much excellent work and planning have been done independently of the reports which have been prepared by this department.

The reports for the different sections of work for the R.D.H.P. Authority have been issued as separates as they became ready. These are: Land Use, Forestry, Wildlife and Recreation. These four reports, together with the sections on Water and History, are now presented in one volume.

- A. H. Richardson

RECOMMENDATIONS
STATED OR IMPLIED IN THIS REPORT

History

1. That, before carrying out any project, the Authority ascertain from the Royal Ontario Museum of Archaeology at Toronto whether the area concerned is likely to contain archaeological material and if necessary arrange for the investigation of the site before operations make this difficult or impossible.
2. That where records, buildings and objects exist of sufficient interest as illustrating the life of the watershed during the period of development, the preservation of these relics be considered an aspect of conservation; and that where such records and other relics are the private property of individuals and corporations within the watershed, the Authority take definite measures to encourage their preservation by their owners or their commitment to proper care in libraries, museums, archives and other suitable repositories.
3. That when sites, buildings or ruins of structures of this kind form part of or are adjacent to properties acquired by the Authority for flood control, reforestation or recreation, the possibility of including them in the scheme be considered.
4. That in such cases sites be marked, ruins preserved and buildings restored and used for some purpose in connection with the project compatible with retaining their original character.
5. That this selection include the sites of all mills known for certain to have been built before 1825; of some later mills, factories and tanneries of particular interest

and of some other buildings of historical interest which have disappeared; some early roads and trails; and some existing buildings interesting for their associations or age.

6. That from the large number of sites and buildings of historic interest (in the wider sense used in these recommendations) to be found within the watershed, a few be selected for eventual inclusion in the scope of the activities of the Authority, besides those connected with recommended projects.
7. That wherever possible, the buildings be left on their original sites and continued in their original use or adapted to some suitable purpose in connection with the normal life of the community.
8. That the Authority provide as part of its recreation program an area or areas where buildings which it is desired to preserve may be re-erected when they cannot be retained on the original site.
9. That all these recommendations be taken as applying with particular force to the Conservation Areas as outlined in the Recreation Section of this report.

Land Use

10. That the valleys of Claremont Creek and Little Rouge Creek be used as soil and water conservation demonstration areas. p. 5
11. That the Conservation Authority co-operate with the people on the land and interested organizations in an effort to promote better land use on the watersheds. p. 6
12. That the program of small valley improvement should be an integrated one and not comprise a series of unrelated efforts on behalf of the forests, soils, water and wildlife. p. 9

13. That the Authority use the maps showing recommended land use as a guide in promoting land use adjustments to land capability and in promoting the use of the various conservation practices. p. 58
14. That the Authority consider employing a qualified man for a short time in order to obtain the co-operation of all farmers in each little valley in a program of farm planning. p. 58
15. That the Authority promote a program of land judging contests, particularly among Junior Farmers, similar to that carried out by the Humber Valley Conservation Authority. p. 59

Forestry

16. That the Authority, under agreements with co-operators or through lease or purchase of suitable woodlots, undertake the development of Woodlot Improvement Projects to demonstrate the advantages of better forestry practice. p. 32
17. That an R.D.H.P. Authority Forest be established and that it be expanded through a definite program of annual additions and planting until the total recommended area of 2,698 acres is acquired and reforested. p. 35
18. That in addition to making its tree-planter available to landowners at nominal cost for use on land suitable for machine planting, the Authority offer a planting subsidy where hand planting is necessary. p. 34
19. That the Authority urge the adoption of a Tree-Cutting By-Law in Ontario County similar to that now in force in York County. p. 30
20. That the Authority, by purchase of equipment, organization of cutting crews, or direct subsidy, encourage

private owners in thinnings and improvement cuttings in their woodlots. p. 39

21. (a) That the Authority investigate the Halton County fencing scheme and adopt such a modified scheme as seems most likely to result in elimination of woodland grazing. p. 44
- (b) That the Authority publish a simple, attractive bulletin on the disadvantages of woodlot grazing. p. 37
22. That the Authority co-operate with schools, government departments and all other groups and agencies possible to publicize the need and the methods of reforestation and woodlot management; and in particular that the Authority sponsor tours, practical demonstrations and field days for this purpose. p. 37
23. That the Authority act as co-sponsor for:
 - (a) 4-H Forestry Clubs p. 31
 - (b) The Tree Farm movement p. 31
24. That the Authority assist in investigating and publicizing markets and marketing methods for woodlot products to encourage:
 - (a) Maximum use of low-grade materials from thinnings and improvement cuttings. p. 23
 - (b) Closer and more uniform appraisal of timber, whether standing or in the log. p. 15
 - (c) Marking of trees for removal. p. 15
 - (d) Securing of competitive bids for timber. p. 18
 - (e) Insistence on a written Timber Sales Contract. p. 19
25. That the Authority investigate and urge the implementation of the best method of providing fire protection for wooded areas within the watershed in co-operation with the Department of Lands and Forests. p. 46

26. That the Authority encourage the establishment of wind-breaks and shelterbelts. p. 52

Water

27. That unattended mill ponds be emptied in the fall to prevent the formation of heavy ice sheets. p. 19
28. That, where practical, dwellings within the flood plains be expropriated and the lands retained for recreational purposes. p. 24
29. That no further encroachments of the flood plains be permitted without being carefully investigated from the standpoint of the flood hazard and their probable effect upon the passage of flood flows. p. 24
30. That, in view of the probable future demand for reservoirs for water supply and flood control, the necessary action be taken now to acquire lands for reservoir sites. p. 27
31. That where flood protection work is undertaken it be designed for at least the magnitude of storm "Hazel" centred in the watershed. p. 28
32. That Scheme B, consisting of a pumping system to relieve the flooding at Goodwood, be considered for immediate construction at a cost of \$33,000. p. 40
33. That a number of community ponds be constructed throughout the watersheds to provide added recreational facilities. p. 55

Wildlife

34. That one or more of seven areas described in the report (which lie in the lower Rouge Valley) be set apart as a natural park and wildlife sanctuary. pp. 1 and 3-12

35. That the Authority encourage farmers and other land-owners to improve their land for wildlife by the elimination of grazing of woodlands, by selective cutting in woodlands, by improved cultivation practices, by the planting of wildlife food patches and by the construction of farm ponds specifically for fish and wildlife. pp. 13-16 and 23
36. That in order to control pollution the Authority urge the introduction of a permit system for every new outlet (except agricultural drains) which leads into a watercourse. p. 21
37. That the Authority carry out an extensive educational program concerning pollution. p. 22
38. That the Authority acquire or urge the acquisition of one or more good stretches of Duffin Creek for public fishing. p. 23
39. That the Authority sponsor a demonstration of an improvement of a trout stream. p. 23
40. That the introduction of fish into the watershed be restricted to those parts of the river shown on the map "Biological Conditions of Streams" to be suitable for the species concerned. p. 29

Recreation

41. It is recommended that the following lands be acquired and developed for public use. pp. 17-19
- | | | |
|---------------------|------------------|-----------|
| Bond Lake Area | 250 acres | pp. 17-19 |
| Highland Creek Area | 2,185 acres | pp. 19-26 |
| Rouge River Area | 1,485 acres | pp. 26-33 |
| White | 1,062 acres | pp. 33-36 |
| Greenwood Area | 720 acres | pp. 36-39 |
| Ajax Area | <u>390</u> acres | pp. 39-43 |
| Total | 6,092 acres | |

These lands could be acquired in any of the following ways:

- (a) Outright acquisition by the Conservation Authority.
- (b) Joint acquisition by the Conservation Authority and the Municipality of Metropolitan Toronto.
- (c) Outright acquisition by the Municipality of Metropolitan Toronto.
- (d) Acquisition by the Division of Parks of the Provincial Department of Lands and Forests.

42. That the Authority gradually acquire and develop the following Public Beach Areas by one of the methods recommended above.

Port Union Beach	7 acres	pp. 51-53
Petticoat Creek Beach	25 acres	pp. 53-55
Frenchman Bay Beach	250 acres	pp. 55-58

43. That the Authority gradually acquire the Cedar Grove Community Park and historical site (255 acres) in order to provide security of tenure for its development by the local community organization, alone, or in conjunction with other interested bodies. pp. 43-49

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HISTORY

CHAPTER 1
BEFORE SETTLEMENT

1. Pre-Iroquoian

The earliest inhabitants of this part of Ontario belonged to the prehistoric races (called the Pre-Iroquoian) which have left traces of their presence in many widely separated parts of Ontario. They were a wandering race of hunters who planted no crops and consequently had few regular camp sites or villages. Some finds have been made in this area, but they do not compare in interest with those of the later peoples.

Excavation may yet reveal more definite traces of the race called the Mound Builders, who penetrated the Great Lakes from the Ohio Valley before the Iroquoian peoples moved into the area. They seem to have left no striking traces above ground such as are found in other parts of Ontario. The greater part of the Indian remains that have been found in this area are relics of peoples of the Iroquoian group.

2. Prehistoric Iroquoian

The Iroquoian group includes most of the races that occupied the southern part of Ontario before 1690. They had entered the area seven or eight hundred years ago - possibly much earlier. Some of them may have been ancestors of the "Iroquois" of historic times; but they may equally well have been Hurons, Petuns or Tobacco Indians, or, though this is less likely, Neutrals.* They spoke related languages, and had a common culture. They all planted crops and lived in fairly permanent villages often fortified with stockades. They built long houses, inhabited by several related families, as well as round huts. They reckoned descent through the mother, were divided into clans with a common totem or religious symbol,

* These are the French names for these nations.

and showed a tendency to form more or less permanent confederacies of tribes or nations. They sometimes buried their dead in separate graves, but more often placed them on platforms for some time. Later the bones would be buried in a communal grave or pit.

The Confederacy of the Five Nations Iroquois was by far the best organized of these leagues. It was formed about 1570 uniting the Mohawk, Seneca, Cayuga, Onondaga and Oneida nations. It is possible that some of these tribes had lived north of Lake Ontario and had been driven out by other Iroquoian nations before the Confederacy was formed. Very early sites may therefore be actually villages inhabited by the ancestors of the historic Iroquois; but those occupied until a comparatively short time before the coming of the French in 1615 were probably occupied by Hurons who withdrew to the country between Lake Simcoe and Georgian Bay where Champlain eventually found their villages.

Indian relics have been found in a number of places in these watersheds and a fairly large group in Scarborough Township was recorded by 1896.* They are all in the north-west quarter of the Township in the area between Bendale, Ellesmere, Agincourt and Amber. They included individual burials, casual finds and indications of camp sites or possibly villages. Some of the sites gave definite evidence of contact with Europeans, but others could be referred to prehistoric times. Unfortunately some of the finds had occurred in an early stage of settlement, most of the sites were on cultivated land and none had been systematically excavated. Until very recently experts hesitated to identify any as village sites, but the evidence suggested a fairly heavy occupation before 1600. The recent chance discovery of a large ossuary or burial pit near the Old Danforth Road, at

* David Boyle: The Township of Scarborough.

Lawrence Avenue and Bellamy Road, confirmed this conclusion and identified the inhabitants as Iroquoian. This find led to the investigation of another location on Highland Creek near Brimley Road and Lawrence Avenue. This proved to be a village occupied about 700 years ago by an Iroquoian people, perhaps the Iroquois. It possibly was connected with the burial pit a short distance farther east, though "graves" on the same lot are recorded in 1896.

Finds near the Rouge in Scarborough Township indicate settlement along the portage trail and extend in to the southern part of Markham Township in the vicinity of Cedar Grove. Two village sites north of Steele's Avenue have been excavated, one on Lot 1, Con. X and the other, a more recent find, on Lot 1, Con. VIII. Both these villages seem to have been occupied before 1600. In the interior of Markham the recorded finds are much fewer. This might be expected for the Indians usually lived within easy reach of a large lake or river, unless there were special reasons for choosing an inland location. The group of finds in the southern part of Whitchurch Township may be partly explained by the small lakes in the morainic ridges. In historic times Indians are recorded to have visited such lakes to take ducks and fish. But the best known of these sites, which lies just beyond the watershed of the Rouge, has been excavated and shown to be a village occupied just before the coming of the French.*

It seems possible that pressure from the Five Nation Iroquois may have forced some of the early inhabitants to leave their homes near the lake and that they settled in the ridges in the hope of retaining command of the portage but were later forced to seek greater security farther north. Not much has been recorded about Indian sites in Pickering or

* This site seems to be the one marked on some maps "Old Fort". Early reports mention traces of palisades and other fortifications; but these were not found in the excavation.

Uxbridge. Most of the finds have been near the lake. No important portage led through these townships and there was less inducement to settle farther inland. The finds near the mouth of the river are probably connected with the Seneca village that will be discussed in the next section and with the Mississauga village or villages that replaced it about 1700.

3. French and Iroquois

The historic period in Upper Canada opens with Champlain's first trip down the Trent River System in 1615. At that time the Rouge portage ran through a no-man's land between the Iroquois and their enemies the Hurons. Champlain never visited this area and it is not known that any of his companions did. He does not show any villages in this area, though he does show a river that may have been meant for the Rouge. The portage was probably little used at this period. The Trent was a less exposed route to the St. Lawrence as the Humber was to Niagara. There is no record that any Frenchman visited the Rouge or Duffin Creek before 1660. Some may have done so in the period when the Iroquois were deciding whether they would ally themselves with the French or the Dutch, but soon after 1630 it became impossible for Frenchmen to travel on Lake Ontario. After the Iroquois had destroyed the Hurons, Petuns and Neutrals in 1650-52, Lake Ontario was even more firmly barred to the French. The north shore became the Five Nations' principal source of fur and fish. The northern Algonkin* nations, Ottawas and Chippewas, had, however, defeated the Iroquois in one or two great battles and were soon strong enough to threaten their control of these hunting grounds.

To maintain this, villages were established along the north shore. The two villages in the Toronto region

* The French called some nations of this group "Algonquins", but gave different names to the others. "Algonkin" is now preferred as the name of the language group.

were occupied by Senecas from the area east of Niagara. One of these villages was near the mouth of the Rouge. The first white men to visit it were the explorers and traders, Peré and Joliet, who crossed the portage to the Holland in the summer of 1669. The earliest mention of its name, Ganatsekwyagon, seems to be in connection with the arrival of two Sulpician priests of the Montreal Seminary, the Abbé de Fenelon and Father d'Urfé, who passed the winter of 1669-70 in the village. They decided to set up a mission there as a branch of the newly-founded mission at Quinte (Carrying Place) and this was done in 1670 or 1671.

Relations with the Iroquois had improved since 1665 and the French were anxious to keep the Dutch out of Lake Ontario. In 1673 Fort Frontenac was founded and for more than ten years Frenchmen could pass freely over the Toronto portages. At first they seem to have preferred to go by Ganatsekwyagon, but in 1678 La Salle sent the first sailing vessel from Cataraqui (Kingston) to Niagara. This brigantine was forced to put in to the mouth of the Humber. From that time La Salle used the Humber route, probably because of the good anchorages near the mouth of the river.

Much less is heard of Ganatsekwyagon after 1678 than of Teiaiagon on the Humber, but there are enough references to show that it was still used from time to time. In 1687 a party of Dutch and English from New York went to attack Michilimackinac. One section under Colonel Patrick MacGregory went "by Taronte" (Toronto, i.e. Lake Simcoe). As they came from Oswego, they probably used the Rouge portage, possibly the first British to visit the area.* War had again broken out with the Iroquois. The mission at Ganatsekwyagon was withdrawn and in the summer of 1687 Denonville, Governor of Canada, led a punitive expedition against the Senecas south of the lake.

* They failed to surprise Michilimackinac and surrendered to the French commander.

On his return in August he stopped at Teiaiagon and Ganatsekwyagon and probably burned both villages. At Ganatsekwyagon he collected "a good share" of two hundred deer, killed by Christian Indians sent ahead to hunt on the north shore. It has been suggested that these converts were Senecas of Ganatsekwyagon, but it is more likely that they were some of the Indians sent from Sault Ste. Marie. After this there is no record of the Senecas of Ganatsekwyagon; they evidently soon retired across the lake.

The location of this village is uncertain. All the French and English maps up to 1757 that show the village (it was marked on maps long after it had ceased to exist) place it on a large river and those that show the portage make it begin on this river. The river is certainly not Frenchman Bay, yet there is a tradition that the Sulpician Mission was at Frenchman Bay. The references to this mission all place it at "Ganatsekiagon". A note on the Dollier-Gallinee map of 1670 against the name of the village reads

"It was here that M. Perray and his party camped to enter Lake Huron - when I have seen the passage I will give it; however, it is said the road is very fine, and it is here the missionaries of St. Sulpice will establish themselves".*

This certainly seems to connect the village with the portage, river and mission. If the village was on the Rouge, a probable site is one about half a mile from the mouth on the east bank. It is said that many Indian relics were found here and that it was once known as Indian Point. It is the kind of site usually chosen for fortified villages which the early British settlers called "castles". No site on Frenchman Bay has been suggested.

* Quoted in P.J. Robinson: Toronto During the French Regime, p. 18. Another note on this map speaks of "villages" at Ganatsekwyagon. There may have been another village at Frenchman Bay.

4. Mississaugas

The arrival of the Chippewas and Mississaugas as settlers in the Rouge area evidently took place early in 1700. In June of that year envoys of the Five Nations reported at Albany that the previous winter they had persuaded some of the "Dowaganhaes (Outawas)" to come and settle "at a place called Kanatiochtiage" on Lake Ontario

"...and accordingly they are come and settled there and have sent five of their people to Onondaga to treat being sent from three Nations who are very strong, having sixteen castles".*

These Algonkin peoples had learnt a good deal from their more advanced neighbours. They now planted corn and so were attached to one locality by their cornfields. They may sometimes have built "castles" at this period; but as a rule their villages were only groups of bark lodges, frequently shifted to a new site for sanitary reasons. They regularly went off in a body to hunt, fish for salmon or make maple sugar. They were good warriors but not very reliable allies, apt to go home at inconvenient times. They caused the French a good deal of anxiety between 1700 and 1757, though they traded regularly at the French forts. On the whole they seem to have preferred the British. During the Revolutionary War, however, they were more of a trouble than a help.

The Mississaugas sold the block known as the Toronto Purchase to the Crown by a treaty concluded at Carrying Place in 1785. This treaty was confirmed at Smith's Creek (Port Hope) in 1788 and another treaty, signed at the same meeting, ceded a deep strip along the north shore from the Trent to the western boundary of Scarborough Township. In what is now Ontario County this purchase was extended northward to Lake Simcoe.

* P.J. Robinson; op. cit. p. 49.

The Mississaugas continued to frequent this area for nearly fifty years after they ceded it to the Crown. They were the Indians who were sometimes a nuisance and sometimes a help to the first settlers. Their behaviour was sometimes alarming, they often pilfered and individuals could be dangerous. But on the whole they gave little trouble. There were no Indian raids on the frontier in Upper Canada except in 1812-14. In that war some of the Mississauga chiefs distinguished themselves fighting for the British. In peacetime they sold the settlers venison, and small game, deerskins, furs, baskets and maple sugar. As settlement advanced the Mississaugas withdrew to the north, but until about 1835 they used to return regularly to camping places such as the one on Lot 29, Con. III in Scarborough Township.* A little later the government with the help of the missionaries was able to persuade them to settle down on reservations.

5. The Indian Traders

After the French retired from Fort Rouille in 1759 the only white men frequenting the north shore of Lake Ontario were illegal traders, mostly from Montreal. The French had restricted trading to the King's posts and the British tried to continue this policy. As they did not occupy the forts north of the lake this practically confined trade to Niagara and Oswego, where the Albany merchants soon established a monopoly. Soldiers were sometimes sent to arrest traders at the Humber and this probably led them to prefer other rivers, less well supervised. In 1767 Sir William Johnson wrote from Niagara

"I am informed that there are several more from Canada trading with the Indians on the north side of Lake Ontario, and up along the rivers in that quarter, which, if not prevented, must entirely ruin the fair trader".†

* Boyle: The Township of Scarborough.

† P.J. Robinson: op. cit. p. 152.

Before long the authorities changed their policy and began to issue licenses to a limited number of traders at Montreal. In September, 1770, Jean Bonaventure Rousseau was licensed to trade at Toronto.

"...and from thence to any markets or parts which he should find advantageous for the sale of his merchandise....."*

His party was to consist of one canoe with six men besides himself, and his merchandise, valued at £300, included a fair quantity of rum, a smaller amount of wine, four rifles, 300 pounds of gunpowder and 1600 pounds of shot and ball. He posted a bond of £600, Provincial Currency (about \$2400). Rousseau made the Humber his headquarters, but could trade at any of the rivers or harbours he passed on the way there, including Duffin Creek, Frenchman Bay, the Rouge and Highland Creek.

Quite a large number of other traders were licensed at this time. Almost all were French and one of these may have established himself at Frenchman Bay. The name Duffin does not appear among them and it would seem that the trader at "Riviere au Saumon" did not set up there till a later date. This was probably between 1788 and 1791. According to tradition he was a "genial Irishman", who welcomed the rare traveller to his cabin near the site of Pickering. One of these travellers is said to have repaid his hospitality by murdering him. He had given his name to the Creek by the time Augustus Jones made his survey in 1791. Jones does not mention him as he does Peter Smith at Port Hope. Probably he was already gone from the Creek, but his name has lingered there until today.

Interest in the settlement of "Toronto" began in 1788, when the Sieur de Rocheblave applied for a large grant in return for establishing a portage service over the Humber

* Ibid. p. 210.

Trail. Lord Dorchester, Governor of Canada, approved this and decided to lay out a town at Toronto. Orders were sent to survey the fronts of a series of townships between the Trent and the Etobicoke. The proposed township of "Toronto" (already laid out on paper) was to be called "Dublin", the next east "Glasgow" and the next "Edinburg". Augustus Jones, Deputy Surveyor for the District of Nassau, made these surveys in 1791, running the base lines and the side boundaries to the lake. He seems to have been expected to take offsets to the shore so that he could sketch the shoreline fairly accurately. He made a bad error, or series of errors, near the line between Edinburgh and Glasgow (Scarborough and Pickering). This placed the shore too far south of his base line, greatly enlarging the broken fronts. It was not discovered and corrected until 1799.

The Canada Act of 1791, by making Upper Canada a separate province, delayed the other plans for the Toronto region and gave the administration of them to the new Lieutenant-Governor, Colonel John Graves Simcoe, instead of to the Governor-General Lord Dorchester. It was not until Simcoe had made his plans for founding York in 1793 that any definite grants were made in the area concerned. It was not until November 1794, that the first settlers were able to establish themselves in these watersheds.

6. The Names of the Rivers

(a) Indian

The French writers and map makers have not recorded any Seneca names for Highland Creek, Petticoat Creek and Duffin Creek. They use some variation of Ganatsekwyagon both for the River Rouge and the village. The word is said on good authority to mean "Among the birches".

On a copy of Augustus Jones' original plan of Edinburgh Township (Pickering), made about 1793, "Keitchee Sepee or great River" is written against the Rouge;

"Kutabokokonk or River of easy entrance" against Frenchman Bay. Another plan made a little later (possibly by Jones) has "Great River" for the Rouge, "Katabokokonk" for Frenchman Bay. Both plans give Duffin Creek its modern name. "Keitchee Sepee or Great River" is written against part of the Upper Rouge on Iredell's plan of Markham Township made in 1794. In his list of Indian (Mississauga) names or rivers, prepared in 1796, Jones calls the "Nen" (Rouge) "Che. Sippi" and translates this "Large Creek". He omits Frenchman Bay and "Sin.qua. trik.de. que.onk" for "Duffins" translating it "Pine wood along side". For Highland Creek Jones' list gives "Yat.qui.I.be.no.nick" as the Mississauga name. The meaning is given as "1st Creek below high land", so the English name is almost a translation.

There were believed to be the Mississauga names for these rivers in 1791-96 by the men of that time. Jones in particular is a good authority for he was intimately connected with Indians, both Mississaugas and Mohawks. Much later, after 1870, the name Katabokokonk was transferred to the River Rouge by some writers. There seems to be no early authority for this, though it is possible that Augustus Jones made a mistake.

(b) Old French

When we look for the French names of these rivers most of the older are of little help. They copy a few Indian names from previous maps and leave most geographical features unnamed. There is (or was in 1893) in the British Museum a chart of Lake Ontario drawn in October, 1757 by Pierre Boucher de la Broquerie to enable sailors to get the bearing of landmarks. An elaborate north-point is drawn in the lake with rays from all 32 points. The shores are rather roughly sketched but many names of rivers and other prominent features are given in a rather eccentric spelling. This chart gives R(iviere) au Seaumon for the eighth creek west of "Canaraski". It is pretty generally agreed that Riviere au

Saumon or Salmon River was the French name for Duffin Creek. The words "de petit Ecort" are written just beyond this river. If they are correctly copied they may refer to a creek shown beyond a deep inlet. Then comes a point labelled "petit Ecort", then two rivers, obviously the Rouge and Highland Creek. They are not named but "grand Ecort" stretches beyond them almost to the "Presille de Toronto" - Toronto Island.

"Ecort" is said to be "Ecore" meaning a steep bank going down into deep water. It appears on a map of 1790 and some others as "Les Grandes Ecors", an incorrect plural. This was the French name for Scarborough Bluffs. Le petit Ecore evidently gave its name to Petticoat Creek. The settlers apparently confused it with "la petite cote" - the little hill. The name "Riviere Rouge" has not been found on any map.

(c) The Present Names

The name Highland Creek is used in documents dealing with Danforth's Road in 1799. River Rouge appears in a report on the road in 1801. All previous documents use Simcoe's name for the river, the Nen. So do the map makers before 1820, except when they corrupt it into "River New". The local pronunciation is approximately "Roosh" and John Goessmann, the Hanoverian Surveyor, calls it the "Rush" in 1824. Duffin Creek is said to have been called "Peak's Creek" at one time. Charles Fothergill tried to have it named "Meander" about 1830.

The origin of the name Frenchman Bay is uncertain. The name is not found on maps before 1820, nor has it been found in any document. Rankin uses it on a map in 1845. The map of 1790 has "Pidgeon Bay" and "Big Bay" is sometimes found. W. H. Smith in 1846 calls it "Big Bay (also called Frenchman's Bay, from a battle said to have been fought on its banks between the old French settlers and the Indians)". The tradition that it refers to the French missionaries seems to originate with some writers of the seventies and eighties.

It may be true; but the name would have had to be handed down by the Indians and no Indian name with this meaning has been recorded. Another tradition that the name comes from French bateau-men who used to stop there to drink the liquor they had bought at York, would refer to a period before 1830. The name, however, seems to refer to a single "Frenchman".

CHAPTER 2

SETTLEMENT - 1794-1837

As soon as it was known that townships on the north shore were to be opened for settlement, the Land Board of the District of Nassau received a large number of petitions for grants in the new area. For the present the Board simply recommended that the petitioner be granted so many acres of land. Definite locations were held over till the arrival of the new Lieutenant-Governor. Even after Simcoe's arrival there was hesitation about making definite locations. The townships between Whitby and the Trent were granted to Associate Companies, but very few specific grants were made within thirty miles of Toronto and it does not appear that any Location Tickets were issued before Simcoe arrived at York on July 29, 1793.

Some of the petitions for land "in the Home District", "in the County of York" or "near York"* were from people who actually wished to move there with their families. The great majority were from people with unfilled claims to "additional lands". These were lands granted "in addition" to the 200 acres that was given without fees to every Loyalist and to each ordinary settler on payment of fees. These included "family lands" for Loyalists, military grants and grants of 200 to 1,000 acres, made at the discretion of the Lieutenant-Governor.† These last paid fees; the first two classes were privileged. One settler might have claims under all three categories. Grants to "reduced" field officers ran as high as 5,000 acres, so that some of these claims were extremely large. In 1793 to 1795 grants of this type took

* In 1792 the District of Nassau was divided into the "Niagara" and "Home" Districts. The County of York then included the present Counties of Ontario, Peel, Halton, Simcoe and parts of other counties.

† The maximum grant was 200 acres "ordinary" and 1,000 additional. Grants at discretion were normally to unprivileged settlers who had "means to cultivate them" or undertook special tasks. They were occasionally added to privileged grants.

up most of the unreserved lots in Pickering Township. They were very numerous in Scarborough Township, but left slightly more room for grants to actual settlers. However, Scarborough for certain reasons was not likely to attract settlers who wanted locations near York.

For these reasons settlers entered the upper part of the Rouge Watershed about two years before there were any settlers near the lake. That this happened was largely due to the fact that Simcoe found himself in a position to place a large number of families near Yonge Street when only the first concession of the Township had been surveyed and opened for settlement. These settlers were ready to go to their holdings at once. This seemed likely to hasten the settlement of Yonge Street which was one of Simcoe's main objectives. Otherwise he would not have been likely to give a reserve on Markham Township to an Associated Company for he did not do so in any other township so near York. This was the "German Company" organized in New York City by William von Moll Berczy.

1. The Berczy Settlement in Markham Township*

William Berczy had sailed from Hamburg in Germany with sixty "Heads of Families" in May, 1792, 229 persons in all. These colonists were destined to settle in north-western New York State, on the vast tracts recently purchased† by William Poultney and his associates. These were being developed energetically by their agent, Captain Williamson, who was engaged in cutting roads and founding "towns". Berczy's

* This account is based on Berczy's own letters and statements, on official letters and other documents and on unpublished narratives as quoted in the excellent Historical Sketch published by the Municipal Corporation of Markham Township in 1950. Almost every statement can be documented and some of the material used has not been printed. References are given only where direct quotations are used. More detailed information about sources will be furnished on request.

† From Robert Morris of Philadelphia, who had bought a much larger tract from the Indians. The British company's Tract included much of several modern counties, between Lake Ontario and the boundary of Pennsylvania.

Germans landed at Philadelphia in July, 1792. They made a short stay near the city to rest and purchase equipment and were then moved into the Company's Tract and employed in making a road to the Genessee River. Some time in 1793 they reached the Genessee Valley south of Rochester and were allowed to settle down for a time. Disputes soon arose over money matters and the question of land tenure. News of these troubles was reported to Niagara and was received there with satisfaction. Simcoe disapproved of Williamson's operations as encroaching on territory not yet surrendered by the British Government. He also disliked the idea of a British company spending money to settle colonists in New York State instead of Upper Canada. In December, 1793 Simcoe wrote to Lord Dorchester at Quebec:

"..... In regard to Mr. Pultney's purchase, the agent Bertzie, is now in Jail, as I apprehend for overdrawing on his employers: and it was with difficulty that Mr. Williamson escaped from falling a victim to the dissatisfaction of the German Settlers. It is more than possible that by degrees these people will emigrate to Upper Canada."*

Berczy was soon released and went to New York City to try to find some other way of placing his settlers. He says that in February, 1794 he saw Simcoe's proclamation of 1792 and fell in with Andrew Pierce who had been given reserves on three townships in that province. Pierce was finding difficulty in getting settlers for his townships and suggested to Berczy that they form a company of associates who would buy Pierce's rights and settle the Germans in one of his townships. Berczy saw the British Ambassador at Philadelphia and was encouraged to apply for land in Upper Canada.

George Hammond evidently communicated with Simcoe after Berczy's visit, for on March 16, 1794 Simcoe tells Dorchester that:

".....Berkzie, the Manager under Mr. Williamson, and the whole of the Germans have shown an inclination to emigrate into Upper Canada

* Simcoe Papers, Vol. II, p.110.

".....I have hitherto, My Lord, taken no measures to forward this Emigration. - To prevent it, Mr. Williamson has long been reporting that if they came to Niagara, I had promised to send them back."*

Four days later the Associates met in New York and passed a number of resolutions appointing officers and outlining an ambitious program of settlement. It was decided to ask for 2,000,000 acres. Two per cent of the land obtained was to be given free in 200-acre lots to actual settlers, including Berczy's sixty families who were to be moved to the land at once. Another ten per cent was to be offered for sale in Germany at 1s. 6d. and twenty-five per cent was to be reserved "for the future disposition of the Company". Each of the eight associates was to have four hundred acres. What was to be done with the rest is not stated.

Berczy now went to Niagara and on May 17th presented a petition for 1,000,000 acres to the Executive Council. He had evidently been advised to reduce his demands. He now proposed "to bring forward Two Thousand Families". The Council ordered a grant of 64,000 acres with leave to apply for more "when they shall be properly settled". Early in June Berczy went to the Genessee to bring his settlers to Canada and by June 26, 1794 they seem to have been at Niagara.

The problem was now to decide where the lands should be located. Simcoe seems to have suggested that the Germans should settle near Yonge Street, but this did not appeal to the settlers themselves. They probably did not wish to go so far inland and a good deal of time was wasted in discussion. It was suggested that Berczy should have a township on the Thames or buy land from the Six Nation Indians on the Grand. There had been sickness; one at least of the party had died, there was a good deal of discontent and Berczy was himself suffering from malaria. On August 12th he writes to the Surveyor-General from the Landing (Queenston):

* Ibid. p.191.

"I did once more my possible to persuade the Germans to go on the Lands back of York, but as the Lots taken oft cannot be returned, I could not afford to bring them to it"*

He was at that time proposing to set out for the "Western Lands" and asked for a surveyor to go with him, but was at the moment too ill. Not long after this, the offer of Markham Township seems to have been accepted. Berczy made a trip to York to examine the lands. He asked leave to buy four lots on Yonge Street and accepted Simcoe's proposal that he should complete the opening of the road in return for these lands. On August 30th he sent a party of sixteen workmen to York to cut timbers for a storehouse and dwelling house and began to collect provisions to support his people through the winter.

On September 1st, 1794 Berczy sent the Germans who were not ill to York. Most of them went by water, but a party under Frederic Sommerfeldt drove the stock round the head of the lake by the trail that was soon to become Dundas Street. They stayed until October 24th, in York while Berczy's hired hands were busy with his buildings and Abraham Iredale was completing his survey of Concessions II to VI. Iredale finished his plan on November 2nd and it was after that, that the Germans were able to go to their lots. In the meantime those of the men who were not ill were employed in opening Yonge Street as far as Asa Johnson's house on Lot 35 W.Y.S. in Vaughan Township.

The settlers also did a good deal of road-cutting in the interior of the township with the assistance of six hired hands. On November 30th Berczy reports that:

".....we have a very easy communication through the Lands, where the Germans has already built more than 40 Houses. All the abovementioned work on the Road was likewise performed by my Germans, to whom

* Survey Records, Ontario Dept. of Lands and Forests; Letters Received No.2, pp. 544-45. Berczy to D.W. Smith, Acting Surveyor-General.

"I joined only 6 other hired Hands. All the rest of my hired hands being employed to build a Saw-mill, the House at York and a large frame House for me in the Township."*

He also says that he has begun to build and clear on Lots 53 and 51 E.Y.S. and has laid out the plan of the "Town or Village on No. 55. And I hope that before next Spring several Clever Houses shall be built there." He says he is constantly receiving applications from abroad and from settlers already in the country and asks for a list of the vacant lots on Yonge Street. He claims to have placed 73 settlers in the township and on Yonge Street and to have seven more looking for lots on the Street.

Berczy had certainly added about ten settlers to his party while at Queenston. He mentions three of these in a later letter - John Dubrey, John "Schutze" and "Francis Dunne". These men were "Germans", possibly from Pennsylvania. Balthasar Mundshaver (Munshaw) and Jacob Winter (who both settled on Yonge Street), George Hall (who went to Whitby Township), and Philip Eckhardt were probably all from Pennsylvania and this may be true of Christian Hendricksen (Henricks). Melchior Quantz is believed to have been a Hessian veteran. Berczy was also including George Sigmund Liebich, who seems to have been the clergyman engaged for three years by the New York Company.† Three other settlers were possibly Berczy's German associates for whom he had taken Lots 51, 53 and 57 E.Y.S.

The Germans seem to have camped near Asa Johnson's at Thornhill while trails were being opened and houses built. The houses were probably in most cases "Small Huts" such as John Lyons was building in 1796-7 for grantees on Yonge Street at £5 New York currency (\$12.50) a hut. There is a tradition that the Germans were helped on their

* Survey Records, Lands and Forests: Letters Received No. 3, pp. 709-711. Berczy to D. W. Smith.

† This is not certain. The clergyman's name is given as C. S. Liebich. A. Jones spells this "Levy".

arrival by Nicholas Miller and John Lyons. Miller was by trade a millwright. He probably built the sawmill at German Mills, while Lyons, who did not move to Yonge Street until 1795, may have been one of the six hired hands. Philip Eckhardt and his family are said to have gone by boat to the Rouge and made their way upriver to the vicinity of Unionville and others may have used this route, for Berczy's roadbuilding seems to have included an improvement of the Rouge Trail. Others who had been ill stayed longer at York; it was not till after Christmas that Frederic Sommerfeldt reached his holding at Cashel (Lot 25, Con. VI).

Sommerfeldt's lot was one of the farthest north in the settlement. The only one beyond him was John Dubrey's who may never have gone to this holding. The settlement began at Lot 6 or 7 in each concession and, except in the sixth, did not extend to the Victoria Square Sideroad. Groups of two or three occupied lots were separated by Crown and Clergy Reserves. To be nearer their neighbours the Germans in the Second and Fifth Concessions built their houses on the east end (or back) of their lots, with the result that, until recent years, there were noticeably fewer houses on the Second and Fourth Concession Roads than on the others. Sommerfeldt and two of his neighbours did not build their houses till towards spring. The Sommerfeldts spent the winter in a tent.

In spring, small crops of corn, peas and potatoes were sown. The seed probably came from the Company, which had provided flour, salt meat, salt and other supplies for the first year. More land was then cleared for fall wheat; for this the settler had to find his own seed. There was a considerable number of cattle. Frederic Sommerfeldt had a cow and some pigs, and Berczy had "let him have" a yoke of oxen when he set out for his holding. He traded a sow for his seed wheat, some corn and some potatoes; but when autumn came he had not enough provisions for the winter.

Most of the settlers were in like case; some were already short in September. Sickness had struck during the winter. Michael Hauser died "without heirs" in January and by October, 1795 five others had died and left their families. The wheat crop of 1795 had been poor, and flour was scarce and dear in Upper Canada. Berczy's petition of February 23, 1796 gives the situation clearly.

"Your petitioner thinks it proper to state that many of his associates are almost starving, that since the month of September last none of them have had any flour, from that period their principal subsistence has been potatoes and turnips, and that in a very short time the small remains of those articles will be consumed.

"Many of the settlers left their families and establishments with a view of obtaining work and provisions in the District of Niagara. Those that remain on their farms and employed in the vicinity of this place amount to one hundred persons, men, women, and children."*

Berczy had been doing his best to help. He had bought flour in Kingston at a high price, and borrowed ten barrels of pork and ten of flour from the Government stores. He was now asking to borrow another ten barrels of pork, eighty bushels of peas and 1,300 lbs. of rice for six months and offering a mortgage on his lands as security. In April he made a fairly large purchase of flour, cornmeal and flour barrels from Abner Miles of York. A good many of the settlers who left looking for work did not return until after 1799; a few stayed away permanently.

June, 1801 was an important date for the Germans, for that month they completed their seven years residence in Upper Canada and were eligible for naturalization. They could then get deeds to their lands and, if need be, sell a portion to free themselves from debt. Berczy says that they had been allowed to believe that patents could be issued six months after going on their locations. They had applied more than once before Simcoe left Canada in 1796 and had been put

* Simcoe Papers, Vol. IV, p. 198-199.

off on the plea of pressure of business. Soon after Simcoe's departure Berczy was told that deeds could not be issued to aliens except after seven years residence. This was followed by the announcement that the reserves granted to associated companies would be revoked by 1798. He was also told to return the supplies borrowed from the King's Stores. Berczy had already strained his credit; the lands of the Company were his only form of security and the value of these claims now seemed doubtful.

The Acting Lieutenant-Governor, President Peter Russell, and some members of his Executive Council were not so well disposed to Berczy as Simcoe had been. They disapproved of Associated Companies, ostensibly on grounds of public policy, but also largely because they wished to locate some of their additional lands in these valuable townships. They also placed a very literal interpretation on the Proclamations of 1792. This would deprive the associates of most of the land they had counted on for their profits. The few Associations whose quotas were nearly complete claimed that Simcoe had encouraged them in a very different interpretation. They had supposed they would receive additional lands in amounts not exceeding 1,000 acres for each settler, while Russell proposed to limit them to 1,200 for each associate and regarded the "grants" of townships merely as reserving an area for settlers brought in by the associates. In very few cases had there been any clear record of the terms or the conversations with Simcoe.

The German Company had an order-in-council for 64,000 acres with a quota of sixty-four settlers. Berczy claimed that he had brought more than seventy settlers to Markham, but the Council had no difficulty in cutting down this list by removing settlers on Yonge Street and some who had left the province or taken land outside the township. Even so their first count showed the quota nearly completed and Russell offered a compromise of 600 acres additional for

each settler and maximum grants of 1,200 for each of six associates if they became residents of the province. The Company rejected this, probably because it ignored their purchased rights in Andrew Pierce's three townships. These had been very little settled.

Berczy now went to Montreal and appealed to the Governor-General, Robert Prescott. Prescott asked Russell for an explanation. This produced a long dispatch throwing all the blame on Simcoe's casual methods of business. Berczy was by now on bad terms with Russell over a building contract. He had further annoyed the Council by issuing a pamphlet on the granting of land in Lower Canada and issuing caveats on Pierce's three townships on behalf of his associates. Jones's report of 1799 was one of several intended to support the Council's stand against the Associated Companies. When the Home Government, in 1801, asked for a review of the case, the Council by some juggling of figures was able to show that Berczy had only settled 33 heads of families in Markham. The figure may be tabulated in the following way:

Unmarried men without servants	21
Joined at Niagara	4
Dead	2
In Upper Canada outside Markham	12
Left Upper Canada	2
Heads of families living in Markham	33
	<u>74</u>
Reported by Berczy in 1797	74

This does not include Berczy himself, though he had mills and another improvement in the settlement.

Augustus Jones reports on June 8, 1799:

Improvements	53
Saw & Grist Mill	1
Settlers living on holdings	32
Living with relations in Markham (?unmarried)...	3
Tenant on Yonge Street	1
At Kingston	1
At York	2
In the Niagara District	9
At Montreal (including the Berczys)	3
Enlisted	1
Dead (family in Markham)	1
	<u>53</u>
Unreported by Jones	22
	<u>75</u>
Reported by Berczy, 1796 (including himself) ...	75

Dressed log house—Lot 17, Con. VI, Markham Township. William Berczy placed Emilius Westphalen on this lot in 1794—no occupant, house or improvement was reported in 1799. Westphalen owned the lot until 1803. The house suggests a Pennsylvania type. Philip Eckhardt is said to have built it. It is still standing, somewhat altered.



Courtesy of Markham Township Corporation.

Frame house built by John Byer, 1829, on Lot 23, Con. VIII, Markham Township. This house was built by Mennonites and reflects the Mennonite type. It was built close to Byer's sawmill and far from the road, but also stood near the old Rouge Trail.



Box Grove from near the site of Tomlinson's mill dam showing United Church to left on hill. A sawmill may have stood here in 1817—Raemer's sawmill certainly stood here in 1824—Joseph Tomlinson's sawmill was running by 1836 and later his grist and woollen mills were the chief industries of "Sparta".



Some of the twenty-two not accounted for returned to Markham; Basler Munshaw was living on Yonge Street; some were dead, but except in two cases their sons eventually patented their lots. Most of those in the province returned by 1804, as did Jacob Boetger, who had gone to Montreal "with Mrs. Berczy's family". Jacob Ebers or Everson, who had enlisted, later settled in Markham Township. The Germans completed their seven years residence in 1801 and applied for patents. Some were issued at once, but the many changes of location, exchanges and sale of lots and the claims of creditors necessitated an investigation that was not finished until 1804. At that time there seem to have been between forty and fifty of Berczy's settlers in Markham Township.

2. Scarborough Township - 1796-1826

In the summer of 1796 David Thomson, a stone mason, who had been living in York and had worked on the new government buildings, set out to find a lot in Scarborough Township. He had probably found out from William Chewett, Senior Surveyor, which lots were vacant. Mrs. Thomson had suffered from fever and Thomson was inclined to go back from the lake. Besides, the part of Scarborough nearest to York and Lake Ontario consisted of "pine plains" and these were avoided by settlers as a sign of poor soil. Thomson evidently followed an Indian path until he found a spring on the bank of a branch of Highland Creek on Lot 24, Concession I. He returned later with a few friends and built a house. To this he moved his wife, using an ox-team and sled belonging to James Elliott. Elliott soon joined the Thomsons in Scarborough. He located Lot 22, Concession D, but as he was still unmarried he may have lived for some time with the Thomsons. Others soon followed. William Jones was pathmaster for Scarborough in 1801 and his farm "near the 12th Mile Post" is mentioned in the report on Dundas Street in 1802. This places him at Woburn.

William Cornwell was pathmaster with Jones in 1801 and Andrew Thomson for the west half of Scarborough in 1802. "Parmer's House" ("near the 10th Mile Post") is mentioned in 1802. This was James Palmer who may have bought Elliott's lot. When James Elliott married the Thomson's niece, Janet, in that year he seems to have squatted on the adjoining Crown Reserve Lot 21. Meanwhile a group was forming near Highland Creek. This included William Knowles, a blacksmith, John Closson and George Post*. Archibald Thomson had settled north of his brothers. In March, 1805, there were 22 householders in Scarborough, with a total population of 102. Thirty of these were Thomsons for each brother had eight children. David Thomson's daughter, Janet, born in 1798, was the first child born in the township. There was a group of settlers near the York Townline, outside the Highland Creek Watershed and some listed in 1805 cannot be placed, but four Secors had settled south of Woburn and two Johnstons north-west of the village site.

Very few families settled in Scarborough in the next few years. In 1809 the population was only 140. This slow rate of settlement continued until after the war of 1812. There was little settlement along much of the Kingston Road as late as 1817. Already, however, the greater traffic on this road was having some effect, and settlement began to spread into the interior of the township. The Kennedys and several others had settled near Agincourt about 1806. James "Canada" (Kennedy) was constable in 1807 and John "Kennady" in 1809. Even after the war progress was not rapid. The next return, in 1824, shows a gain of 529 in the fifteen years since 1809 - an average of only seven or eight families a year. There had been a gain of 35 since 1823 - this was only average; but in the next two years the gain was 192.

* George Post appears as a settler in Markham also. This was the George Post who moved to Pickering later. He was succeeded on this lot by his nephews George and Jordan Jr. Which George Post improved a lot in Markham is not clear.

The reason for this was still the large acreage of absentee holdings. Until after 1823 there was almost no incentive to make these holdings productive or dispose of them. Some of the settlers mentioned rented reserves and settled on them, like Daniel Herrick* on Lot 8, Con. D, and there is a little evidence for squatting mostly after 1815. Before that date squatting was rarer in Upper Canada than is sometimes stated. In this area also the inhabitants of York had been given a priority in locating their additional lands. They were in a better position to watch their rights in this area than in more remote areas. Squatting on reserve lots was not uncommon. It was limited in Scarborough because absentees and residents, like the Thomson, Elliotts and Johnstons, were using leases to enlarge their holdings. The returns make it plain that there were only a few squatters before 1820 and very few mills. Farming, cutting firewood, and lumbering for export were the chief occupations, apart from innkeeping. George Post received a licence for an inn at Highland Creek in 1811. This seems to be the first inn recorded in Scarborough. About 1815 David Thomson built a tavern near his first house "on the old Markham Road". A little later Levi Annis and Jonathan Gates opened theirs on the Kingston Road in the vicinity of Scarborough.

The first shop in the township is said to have been opened in David Thomson's old house by the Widow Stafford. No date is given and the returns show no "merchants' shops" before 1831. In 1825 there were nineteen houses of squared timber, three had an upper storey, but only one a second hearth. There were seven frame cottages, two with extra hearths. The three two-storeyed houses "of frame, brick or stone" were probably taverns, and of frame. The other families all lived in round-log houses with only one hearth. In this also, Scarborough was far behind Markham and some other townships.

* This seems to be Daniel Herrick, Jr. There was another Daniel Herrick in Markham Township in 1805.

3. "Windham" and the French Royalists - 1798-1806

While Russell was disparaging the Germans in Markham in 1797 he was engaged in preparing for another settlement on somewhat the same lines and partly in Markham Township. The idea of providing for some of the Royalist refugees from France (who had been existing rather miserably in England since 1789) by sending them to Upper Canada had been proposed several years before. In 1797 it was announced that a party was on its way and that others would follow. These were mostly veterans of a force raised in England as part of an expedition sent to help a Royalist rising in the district of La Vendee in Brittany. The rising had been suppressed after desperate fighting. The British force had been successfully withdrawn, but some, at least, of the new settlers were experienced soldiers. This gave Russell the idea of settling them on Yonge Street as protection to York against attack over the portage. This idea has been ridiculed, but if the refugees had come in the expected numbers, they might have provided a useful militia in what was then an unsettled area.

A reserve was placed on Whitchurch Township and an investigation made of the vacant lots on Yonge Street. Most of the vacant or forfeitable lots proved to be above Richmond Hill. It was decided to settle the Royalists between Lots 51 and 63 and to lay out a "village" that would absorb the site of Berczy's abortive "town". This was called "Windham" and took a form not uncommon in Lower Canada. It was possibly thought that for this reason it would appeal to French settlers. Forty lots of fifty acres with frontages of $82\frac{1}{2}$ feet were laid out east of Yonge Street and forty-four to the west. If the whole 84 were eventually occupied, the houses would be less than forty feet apart and extend for two and a half miles. These would make inconvenient farms, but it was probably intended to give the first settlers more than one lot in Windham. They were expected to have other lands on Yonge Street. The soldiers

were to have the same military lands as other veterans of their rank and civilian gentlemen maximum grants. In the end it was not found practicable to dispossess the defaulting grantees on Yonge Street. The reserve on Whitchurch was revoked in October, 1799.

Some of the party wintered in Kingston, where there was more and better accommodation for transients than at York. The Count de Puisaye, the most energetic of the three generals who led the party, went at once to York with some other officers including Major Quetton St. George. They soon went up Yonge Street with fifteen men and began clearing and building houses. It is not clear whether these were hired axemen or whether they were some of the sixteen soldiers who came with the party. Probably there were some hired men, for the Royalists were not without funds.* The clearing went forward at a good rate; by June 10, 1801 the cutting of the road allowance had been done better through Windham than on any other similar stretch of Yonge Street. On seventeen old 200-acre lots settlement duty was completed or nearly so. There were at least 17 houses, probably more and the smallest of these would have to be 16' x 20' in the clear. Where the size of clearing is mentioned in doubtful cases, it is more than five acres and most of the clearings were fenced.

The party was heavily officered, with three generals, a colonel or two, two majors and three captains.† About ten or twelve of the party belonged to the high nobility. Most of the gentlemen came from the lesser provincial nobility, though they possessed elaborate names and, no doubt, had once had long "preuves de noblesse" set out on parchment. Besides the soldiers there were six menservants, four of them

* The officers would be entitled to "Foreign Half-Pay".

† These ranks are given in official lists and seem to be those for which they drew lands. They are sometimes given higher titles, but these were probably not those held in the British Army List.

English and four maidservants, all French. The majority of the party were commoners.

It was not a satisfactory group to settle on the frontier. The houses at Windham were occupied in 1799, but in spite of their energy in improving, the settlement did not prosper. The Comte de Puisaye secured a mill site and talked of building mills, but soon gave up in despair and went to Stamford, where he had some success as a trader. The Vicomtesse de Chalus, who had gone to Windham with her husband and father-in-law, was soon sending complaints to the Governor and persuaded her husband to leave the settlement. The Comte de Chalus was more persevering. He was at Windham on May 24, 1805, when he gave a combined character reference and settlement certificate to John Kennedy of Markham Township, stating that Kennedy and "several of his children" had worked for him every year and "Se Sont Conduits en très honêtes Gens".* Quetton St. George removed to York, but kept up his connection with the area by trading with the settlers in Markham and Whitchurch and buying their wheat at Elisha Beman's mills in Newmarket and "Norman Milliken's Mills in Markham" (? German Mills). He became one of the most prosperous merchants in York, built the first brick dwelling in the town in 1805 and later had a fine estate on Willcocks Lake which included St. George Lake.

No other Royalists were sent out and Windham gradually dwindled. The other gentlemen drifted away to York, Newark or Montreal. In 1806-07 they patented their lands in Markham, Whitchurch and Uxbridge. The Peace of Amiens and Napoleon's ~~am~~nesties made it possible for moderate Royalists to return to France and almost all the gentry of the Windham settlement did so. What happened to the rank and file is not recorded. Some had moved to Newark and none seems to have patented lands on Yonge Street.

* This seems to be the only certificate written in French.

Though this experiment was a failure it brought some benefits to the area. This part of Yonge Street was better cleared than it was otherwise likely to have been. The necessity of sending government supplies to the Royalists led to improvements on Yonge Street. The Royalists' improved farms passed into more capable hands. Some other settlers seem to have moved to the village. Samuel Street Wilmot was dating letters from "Windham" in 1804. The Royalists employed labour and probably brought trade to the one or two stores near the site of Richmond Hill. The development of the district was hastened, even if the actual settlers got little gain from their time in Upper Canada.

4. Pickering Township, 1798-1825

The situation in Pickering Township in 1793 was unusual. There were no physical features likely to discourage settlement as there were in Scarborough. The township could be easily entered from the lake and near the lake was reasonably level without conspicuous areas of "pine plains". But not only had one definite location already been made in 1792, but this had been located in the front of the township and was a solid block of 5,000 acres. The lots were military lands granted to Major John Smith, Commandant at Fort Niagara, as a field officer who had served in the Revolutionary War. To them were added 1200 acres for his son, Lieutenant David William Smith, whom Simcoe was soon to appoint Acting Surveyor-General of Upper Canada. It was unusual to give a field officer his lands in one block and still more so to allow him to take more than two or three lots on the "front" of a township.

Major Smith's block was eventually broken to some extent when the Reserves were inserted in the usual "chequered" pattern. He still occupied two and a half miles of Broken Fronts at the east side of the township and his holdings extended even farther north than before - as far as the Third Concession. His son's holdings were in the same concessions,

to the west of Major Smith's and in groups of two or three lots. Major Smith died in 1795 and all these lands came under the control of David William Smith. Smith took some of his childrens' land in Pickering and advised Major Aeneas Shaw of the Queen's Rangers to take a large part of his military grant immediately west of his own holding. A little later Chief Justice Elmsley was granted a good share of Concessions III to VIII and sold his holdings without delay to Jacob Farrand, a York merchant. Other inhabitants of York received smaller grants that accounted for almost all the unreserved lots south of the Ninth Concession.

Not many of these absentees showed any inclination to sell until about 1804. As a result more of the first settlers in Pickering took reserved lots on lease and actually settled on them than was usual at that stage of settlement. Some were content to be tenants for a time on private lands, a few made purchases and a very few got Crown grants. By 1802 it was nearly impossible to find vacant Crown lands except in the Ninth Concession and in the western part of the Eighth, Seventh and Sixth. For this reason some of the early groups were located far inland, with much undeveloped land between them and the lake.

William Peak is believed to be the first settler in Pickering Township (excepting the ill-fated Duffin). He came to the mouth of Duffin Creek as an Indian trader in 1798 or 1799. In 1796 he was living next to John Stoner in the southwest corner of Hope Township. Both Stoner and Peak applied for confirmation of these lots in 1796 and are included in Elias Smith's list of his settlers in Hope in 1797. John Stoner followed Peak to Pickering* within a year or two. There were some other settlers who came in the interval but not more than one or two settled in this area.

* Later there were Stoners in Scarborough as well as Pickering.

When Dundas Street had been opened in December, 1799, a number of settlers arrived, some settling on the Street, others a short distance to either side, wherever they could find locations. There were not enough in 1799 or 1800 for special officers to be appointed for Pickering at the York County Meeting, as was done for Scarborough and Markham in 1799 and for Scarborough for some years after. A joint Town Meeting for Pickering and Whitby Townships was held at Samuel Munger's on June 4, 1803, This is believed to be the first meeting. Munger leased Lot 16, Con. II in 1801 and lived there for five or six years before moving to the vicinity of Kinsale. The bridge over Duffin Creek near "Munger's" is mentioned in 1802, and on August 10, 1805 the York Gazette published an item that gives a vivid glimpse of the early settlement at "Duffin's".

"Heroic action of an Upper Canada woman, Mrs. Munger, of Duffin's Creek, in the township of Pitcairn (sic), 23 miles from York, hearing her neighbor, Mrs. Woodruff, holler out for help, immediately took down her husband's gun and ran to her assistance; when she arrive ther she was informed that a very large bear had taken off a sow into the bush. His route being shown her this heroine immediately pursued and found the destroyer in the act of devouring the sow; upon which she rested her gun on a stump and shot Bruin through the head. On weighing the bear it proved to be the largest that had been killed in that township."

Mrs. Woodruff was the wife of Noadiah Woodruff, a Quaker, who at that time had his house on Lot 16 west of Munger's.* There was probably a third neighbour beyond the Creek for Salmon Fuller had leased Clergy Lot 15, Con. I in 1802 and he is known to have been in the township about this time.

The list of officers appointed in 1803 gives the names of some of the early settlers in Pickering Township. These include John Majors (sic), one of the assessors, Samuel Munger, pathmaster, William Peak, David Crawford and Abraham

* He bought Lot 17, Con. I in 1813 and moved there.

Townsend, fence viewers. The locations of some of the others are doubtful; some may have been living in the eastern part of the township or in Whitby. Two or three are known to have been in Whitby.

A list of location tickets issued in 1802 has the names of 19 grantees in Pickering Township. One of these was a York merchant and three others were probably absentees. The Location Ticket was the settler's licence to occupy and improve a particular piece of land. It was the fourth stage in the process of obtaining a grant. The first was the petition, followed by a recommendation to the Governor and an order by the Governor in Council. After 1792 the Land Board of the new Home District was practically a committee of the Executive Council, so there was little delay between the recommendation and the order-in-council if the petition was approved. The order went direct to the Surveyor-General who issued the Location Ticket and entered the name of the nominee on his plan of the township. The nominee could now take possession of his lot and perform any settlement duties that might be required. On producing evidence that these had been properly complied with, he could have the grant confirmed. He was now safe from forfeiture for non-performance and could sell, bequeath or otherwise assign his rights. To have a clear title, however, he had to go through the complicated process of patenting and to settle any fees not yet paid.

At that time it was usual to date the grant from the order-in-council and not the patent. This was reasonable for the settler might be in possession of the land for many years before it was patented. Unless the order-in-council gives a definite location (which was not usual), the Location Ticket gives the earliest possible date of legal occupation, but where settlement duties were not required or not enforced it does not imply that the settler went immediately to live on his holding. A certificate of settlement duty after

1798 (if honest) implies at least a house and clearing, and a family in at least temporary residence. This is not always the family of the grantee. Only a certain number of certificates have survived and only a few of these give the name of the resident and the length of his residence on the holding. The patent is no use in determining the date of settlement. Information can be gleaned from some other documents, such as the "description" which had to be issued before each patent, but this information is seldom conclusive. It may, however, serve to check and possibly confirm a traditional account of the arrival of the settler and his family.

Settlement duties had been vague until 1798 when Peter Russell issued a proclamation extending the duties required on Yonge Street to the adjoining townships. General Peter Hunter, Simcoe's successor as Lieutenant-Governor, added other townships in the Home District and made the enforcement much stricter. In these townships, of which Pickering was one, only a few exceptions were allowed at the time of granting or on a later petition. No patents were issued without certificates after 1800 and, as Hunter made settlers pay the full fees directly after getting the Location Ticket, patenting was done promptly until about 1810. The series of copies of certificates in the Survey Records is not complete. Only eight have been found for Pickering and marked on the first map. All but one are for locations listed in 1802. The exception is for the lot bought by Joshua Wixon next his brother's and certified by Joseph Wixon in 1812.

The distribution of these locations is interesting. There were none south of the Fifth Concession. In Concession V, John Major was given Lot 18 and directly east of him were David Crawford and John Ryckert. Major and Ryckert moved later to other locations though they did not patent these lots until long after. Crawford seems to have been a

Quaker, one of the first in Pickering.* In 1824 he joined the Christian Church. Two Crawfords were among the first grantees in the Quaker settlement near Uxbridge Village. Caleb Palmer was the only locatee in Con. VI. He had done his settlement duty on Lot 23 by 1805. He sold it before long to Cornelius Churchill. The two grants in Con. VII were to absentees. So were two of the four in Con. VIII and the other two appear to have moved away by 1811. In the Ninth Concession a group of five locations between Altona and the Markham line were given to grantees whose relations held lands in Markham. Amarilla McKay petitioned in 1807 to be relieved of settlement duty, but the others probably lived on their lots for a few years before selling them. Farther east was the group near Claremont. These settlers at Claremont did not swear certificates for each other until 1812.

Some of these settlers delayed a long time before taking their patents. John Major did not patent Lot 18, Con.V until 1828 and John Ryckert, Lot 16, until 1831. Jacob Clock waited till 1823 to patent Lot 29, Con. IX, Abraham Townsend's case is curious. He lived in Pickering until after 1811, but had left Lot 20, Con. IX by 1836. In 1840 he petitioned for a patent, stating that he was "located" on the lot. The note in the minutes of the Executive Council continues;

"The Clerk is directed to place the papers in the hands of Her Majesty's Attorney General, with a view to prosecute the parties concerned for the fraud and conspiracy appearing on the papers".

Townsend does not seem to have returned to Claremont, but he does not appear to have been prosecuted, so possibly someone else was at fault.† Frauds in connection with certificates and patents were not uncommon. They were easier to detect in this region than farther from York and the settlers were mostly pious and honest men.

* His certificate was affirmed by Russell Hoag, a Quaker.

† Townsend did not get the lot.

Timothy Rogers is reported to have brought 21 families of Quakers to Pickering in 1809. However, this probably includes the settlement in Uxbridge and some already in Pickering, for it is hard to identify so many Quakers among the families who settled in Pickering before 1810. A good many families connected with the Pickering Meeting came from Ireland in 1810-20. There may have been a considerable defection when the Christian Church of Brougham was formed in 1824. Several of the 27 families in the list of members (about 1831) may have been Quakers besides the Crawfords. Timothy Rogers was organizing his Uxbridge settlement in 1804-07. In 1807 he bought about 800 acres in Pickering from D. W. Smith. This included Lots 13 and 14, Con. I and lands on the lakeshore and along the east bank of Duffin Creek. Some of these latter Rogers sold immediately to William Peake.

Rogers seems to have settled on Lots 13 and 14 near Dundas Street, in what is now the eastern part of Pickering Village. It may have been he and not Charles Fothergill who called this property "Monodelphia Farm", for the name has a Quaker sound. He built the first grist mill in the township, and probably the first sawmill. At the first separate Town Meeting held in 1811 Timothy Rogers was elected poundkeeper with Joseph Wixon. The new officers or their descendants were later well known in the township. Thomas Hubbard, Town Clerk, had bought the lot next to John Major's location from David William Smith (Lot 19, Con. V), probably in 1806 or 1807. Thomas Matthews, Pathmaster, had patented Lot 18, Con. VI in 1799, but may not have moved to Pickering before 1805. John Laurence later lived farther up the Uxbridge Trail on Lot 19, Con. VII. John Haight, Assessor, a Quaker, had also bought part of Major Smith's block. The two Town Wardens had bought lots in this block east of Ajax on the lake. The other assessor was David Crawford; Noadiah Woodruff was a pathmaster and Abraham Townsend pathmaster and collector.

The opening of the Uxbridge Road and the sale of the Smith properties made a great difference to Pickering. With groups of settlers established in the township, other absentees were ready to sell or to occupy their lands. In 1809 there were 180 persons in Pickering, probably representing 35 families with a few other single householders. In 1805 the households may have numbered about twenty. By 1820 the population was 375, a gain of about 40 households since 1809. The town meetings were interrupted during the war, but from 1815 on a number of new names appear among the officers. A settler had usually been a year or two in the township before holding office.. Thus the Yakes and Casters may have been living west of Altona before 1808 and the Udles by 1813. None of them held office until after 1816. James Wright Sharrard, at whose house west of Brougham the Christian Church was formed in 1824, came there about 1812 and held office in 1817.

In the early twenties the pace of settlement quickened. The gain in population in 1820-24 was an even 300 persons. Settlers were coming in from other townships for example Posts, Knowles and others from Scarborough, Stouffers, Reesors and Millers from Markham. In some ways the township was still backward. There were as yet not many inns. Peter Anderson had received a licence for Pickering in 1806 but is listed under Markham in 1805. "Woodruff's tavern" near the Duffin Creek bridge is mentioned in 1808. There was a tavern at the Rouge in the 1820's and probably Woodruff's inn was still open at Duffin Creek, though he seems to have rented it to others after 1813. Francis Leys, a Scot from Aberdeen, had the only store in the township in 1824 and for many years after. He put up travellers in his house at the east end of Pickering Village (free if they were from Aberdeen), but did not have a licenced inn. The chief inn in the township was, by this time, George Post's, some distance east of this area. The seven, two-storeyed houses of frame, brick or stone in 1825

probably included Francis Leys' and the two or three inns. They had 20 hearths among them, so some were of good size. There were a few dressed-log houses (9) and fewer frame houses of less than two storeys (8). The population in 1825 was 760, so there must have been about 125 round-log cabins.

5. Whitchurch and Uxbridge Townships - 1801-1825

The settlement of the part of Whitchurch drained by the Rouge and Duffin Creek is an off-shoot of the Lundy-Phillips Quaker settlement centring round Pine Orchard. Not all the settlers were placed by Lundy; in 1801 John Stegman, D.P.S. gave in the names of seven settlers for this area. Stegman had just finished the survey of most of Whitchurch. He received several lots for himself in Concession IV and absentee grants took up the other unreserved lots in this concession. On September 22, 1802, five Location Tickets were issued in Con. V, six in Con. VI, seven in Con. VII, two in Con. VIII and one in Con. X. In May, 1803, two were issued in Con. VIII and one in Con. XI. This was not the full number of grants, but most of the rest were additional lands, some given to Quakers, some to children of Loyalists and some to settlers in Markham. Some of the Location Tickets were to absentees, but most to actual settlers.

Between 1805 and 1811 seventeen settlement certificates have been found, most dated before 1807. They show that there were at least sixteen houses, five barns and a stable. One of the barns, Ebenezer Cook's, was 33' x 22'. Most of the houses were reported as the standard size, two were slightly larger. The smallest was Jacob Long's on Lot 1, Con. X - 16' x 16'. George Lemon's certificate was affirmed by Asa Randall and Isaac Davis on May 18, 1805. His house was sixteen by twenty and he had "a good large log barn" and 15 acres cleared and fenced. William Macklem and Ebenezer Cook had fifteen-acre clearings. William Pearson had cleared $6\frac{1}{2}$ acres and built a house 18' x 18'. Five had clearings

of 9-10 acres; the rest were the standard 5 acres. Some of these owners were living elsewhere in the township. Nathaniel Pearson settled on Yonge Street and Osburn Cox was probably living on one of his lots (Lots 4 in Cons. V and VI). Jacob Weidman was probably on Lot 1, Con. VIII, granted to an absentee. John Evans is also described as "of Whitchurch". Russell Hoag had been living on Lot 1, Con. IX since 1803. He had leased the adjoining Clergy Reserve and probably sublet it in 1804 to Abraham Stouffer. Stouffer affirmed Hoag's certificate in 1805 and is described as "of Whitchurch, farmer". He bought Lot One from Hoag almost immediately after the certificate was filed.

The Stouffers and Weidmans were Pennsylvania Mennonites. Other Pennsylvania Dutch settlers moved into this section after 1804. Settlers from Markham and elsewhere also bought farms, some of them in the Fourth Concession, as for example Peter Brillinger of Markham and Andrew Clubine of Yonge Street. It can be calculated that there were 100-125 people in this part of the area in 1809. The number may have increased considerably by 1825, but it is impossible to give figures for a small section of a township. Development in this section was similar to that in Markham but slower, for the area to the north around Musselman Lake and Ballantrae was not settled until the 1840's.

There was practically no permanent settlement in the south-west corner of Uxbridge before 1830. Some lots between Glasgow and Altona were reserved for Samuel Jackson, a Quaker who may have been the hatter brought by William Bond for his proposed hat factory at Bond Lake. Jackson and the other hatter soon went to York and Samuel Jackson was living there in 1805. Several Quakers were granted land in this part of Uxbridge, and many absentees received grants, among them the Vicomte de Chalus at Goodwood, the the Chevalier de Marseuil. The grants were not subject to settlement duty and if any

Quakers settled near Glasgow they soon left. Some may have lived near Altona for a time. Russell Hoag had a lot east of Altona and seems to have been in the vicinity of Pickering in 1807, when he affirmed a certificate for David Crawford. In 1828 there were only 228 people in Uxbridge and the settlement around Uxbridge Village would account for all of these. In 1831 there were no houses on the Stouffville Road between Plank's tavern at Uxbridge and Whitchurch.

6, Markham Township - 1800-1825

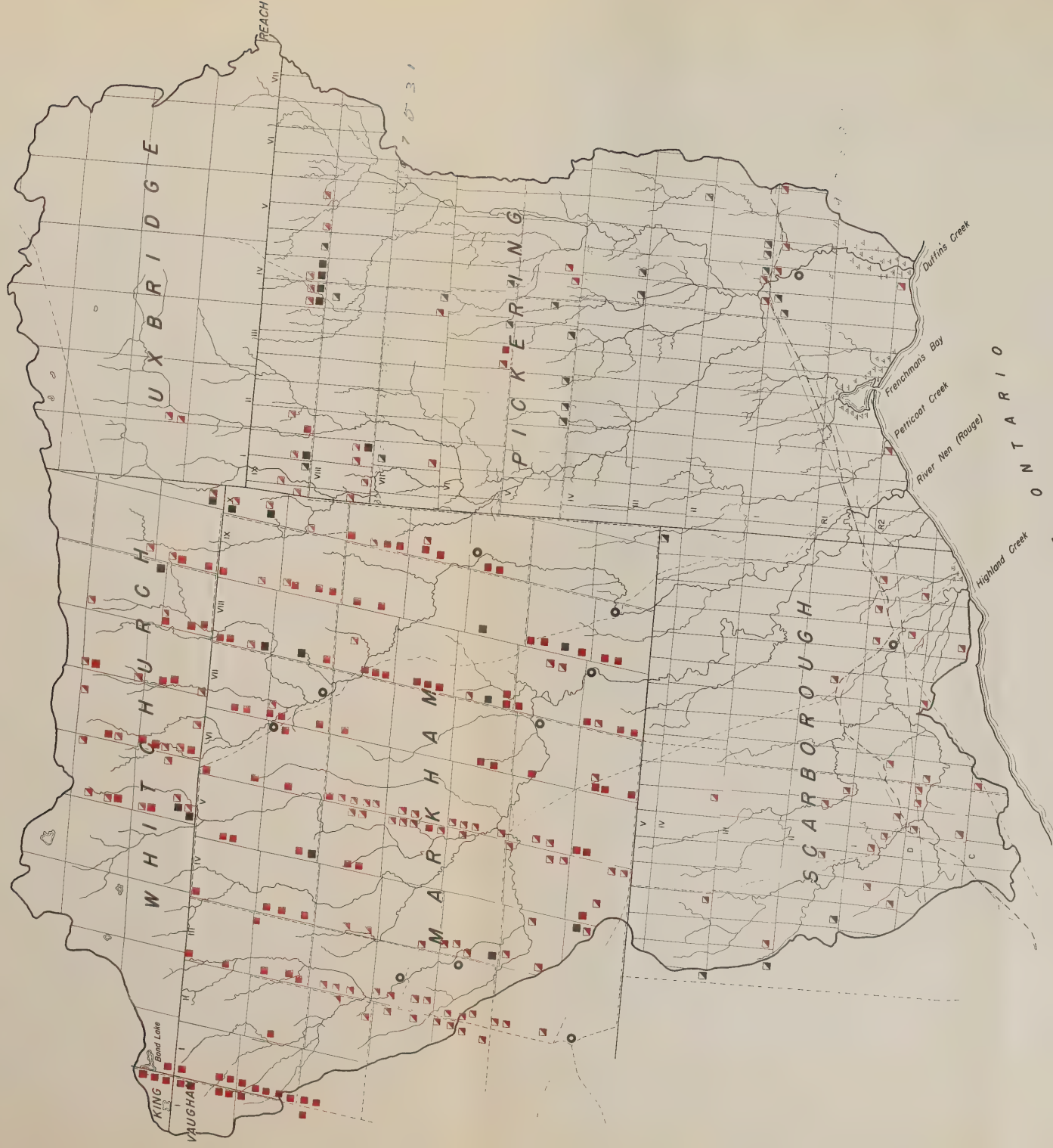
In 1798 almost the only settlers in Markham were on Yonge Street or in the German settlement. It was only for these settlements that officers were appointed at the York Meeting of 1799. Melchior Quantze was constable and John George or Schutze pathmaster "for the German Settlement". However, the opening of the township to ordinary settlers had brought a rush of applicants. A number of Location Tickets were issued in 1799-1801. How many is not known, but settlement certificates begin in 1802, and give us the names of seven settlers who were living in the township. These include some well-known names - George Mustard, John Button, Norman Milliken, William Bentley, Jasper Hubbard and Samuel Moore. Some of these received certificates and had been on their holdings since 1801 at least. One or two took oath for their neighbours and are described as "of Markham".

This was not the complete list for 1799-1801, for though the number of certificates found for Markham is large, it does not cover all the grants. Most of the settlers named appear in a list of Location Tickets issued in 1802. Their certificates state that they moved at once to their holdings. The list of tickets contains 14 names for Markham, but some of these settlers did not file certificates until 1815. Three settlers who received tickets in 1803 were already on their lands. The symbols on the first map simply indicate the date of the certificate. The settler may have

been living on the lot for several years. For 1803 seventeen new names appear in the certificates. Two of these settlers also received land in Whitchurch and one, Ebenezer Cook, seems to have settled there. He may have been two or three years in Markham and been about to sell his lot there in 1804. Among the other names are Ort (2), Cook, (John), Miller, Clendenning, Spring, Lamont, Rawn, Schell (2), Westbrook, Bentley (Reuben), Hamilton and Wurtz. Moses Terry is in this list but had probably been in Markham since 1800.

It will be noted that by no means all the names are German and in fact in the later years the German names are even less numerous. The movement of "Pennsylvania Dutch" was at its height in 1804-06, but by then there were few vacant lots and the "Dutch" appear in the certificates mostly as performing duties on lots granted to others or as giving certificates to owners. In both cases the object was to buy the lot. In 1804 the names are Holter, Beeker, Reesor, Brillinger, Weiant and Hederich. Philip Weidman is mentioned for 1805 and John Stover (Stauber or Stauffer) in 1806. Those who bought patented lots had no concern with certificates and many wellknown names such as Heise, Hoover, Lehman, and Nighswander do not appear on certificates. Among the late certificates are those of the Keysters (Caster) and Longs (Lange) in the Tenth Concession. These appear on Location Tickets of 1802, with Krister, Feightner and Beck. There were some settlers of Netherland origin from New York, DeGeer, DeLong, Van Horn, Vancise and Vanzante. Several Millers also came from New York State. There were Scots like the two Mustards, the Hamiltons, Gordins, Kennedys, Grahams and Lamonts, and names that suggest Welsh or English origin. Most of the settlers, however, had lived for a time in the United States. Direct immigrants from Europe were few until after 1816.

In spite of the settlement duties there would have been many absentee grants in Markham, but General Hunter appears to have adopted the practice of rarely giving more



ROUGE, DUFFIN, HIGHLAND AND PETTICOAT WATERSHEDS

SHOWING ROADS AND MILLS ABOUT 1817 AND SOME
 DOCUMENTED INFORMATION ON SETTLEMENTS

L E G E N D

— Township Boundaries
 - - - Surveyed Road Allowances (some partly opened)

DUNDAS STREET

— A. Jones 1st. survey line (1794)
 - - - Stegman's surveyed road line (1799)
 - - - Donlin's actual road (1799)

OTHER ROADS

— Early trails in use in 1817
 - - - Travelled roads in 1817

○ Mills

SETTLEMENT

■ Settlement certificate before 1809
 ■ Mentioned in other documents before 1809
 ■ Settlement certificate before 1817
 ■ Mentioned in other documents before 1817

S C A L E 1 1/2 0 1 2 3 4 5
 M I L E S

than one lot to an individual. The inhabitants of York, Yonge Street or other sections who were granted or acquired lots in Markham had learnt to regard them as investments that would bring a quick return or a steady income, not as speculations to be held for a rise in land prices. They seem to have had no difficulty in finding settlers who would do the duties and then buy or rent the lot. Prices were good in 1804-10 and the demand keen. The presence of established settlement was largely the cause of this demand. The Berczy settlement had not peopled Markham but it had opened it up. There may have been 225 people in Markham in 1799; ten years later there were nearly that number of families. The population in 1809 was 1,111; by 1823 it was 2,255. The increase had slowed down after 1816 for there was even less available land and until holdings were divided and villages began to form the township could not absorb a large number of new inhabitants.

The Pennsylvania settlers came in small groups. They often sent one member ahead to look for a good location. The Lutherans seem to have come by Yonge Street. They mingled with the German settlers and later built both their churches in the Berczy settlement. The Mennonites seem to have entered the township by the River Rouge and improved the old trail. Their locations extend along its line from Cedar Grove to beyond Milneville, with others along the Pickering Townline. Peter Risor or Reesor is said to have come in 1802 and selected a site near a spring on the bank of the Little Rouge. He is reported to have traded his pony, with saddle and bridle, to someone in York for a lot in Markham. The lots he actually bought in 1804 were Lots 3 and 4 in Con. IX. Lot 4 belonged to James Osburn of Markham Township, who may have been living on it since he had a house and 12 acres cleared by November, 1804. The larger house and five-acre clearing on Lot 3 were most probably made by Peter Reesor himself. He

brought his family to Markham in 1803, accompanied by Christian Reesor, Sr. and his four married sons. The Christian Reesors took the branch trail into Con. X, where Christian Reesor eventually acquired enough land to provide farms for most of his sons. Jacob Reesor came later.

The Weidmans, Byers and Stouffers had to go farther north, even to Whitchurch Township. The few Tunkers settled in the vicinity of Heise Hill. They were separated from the Mennonites by a group of Scots and English settlers near Cashel. As a rule the settlers were more mixed as they were in the first few lots north of the Scarborough Townline. The "Dutch" element predominated and became more marked as the original families multiplied and spread out.

The ninety-odd certificates show that on the whole duties had not been scamped. The great majority merely mention the required five acres. Some may have had more and a good many clearings of from 10 to 18 acres are mentioned. John Cook had cleared twenty acres by 1803 and had a barn. John Clendenning had built himself a house "of Hewed and Doughetailed Logs", 28' x 20', with a barn foundation and some other buildings. He had cleared 18 acres. Altogether thirteen barns are mentioned. Daniel Herrick's was 30' x 20', the same size as his house. This was possibly the largest house in the list, but some are nearly as large and several are over the standard size. Thirty acres was considered a cleared farm up to 1830 - as much as one man needed. It is not until 1806 that a thirty-acre clearing is mentioned in a certificate. This was Josiah Hemingway's near Hagerman's Corners.

Joachim Pingel had had such a thirty-acre clearing in 1799. Seventeen other Berczy settlers had clearings of from 7-16 acres. The rest who had stayed away longer or had not returned had less cleared. Several of them had moved since 1796, so they had had only a season or two for chopping. By 1804 the Berczy settlers who were on their lands must have had

large clearings and settlers who bought these farms had the benefit. The Germans who had had the largest clearing in 1799 were the ones who remained in Markham, Sommerfelds, Quantzes, Helmkes, Eckhardts, Ruhmors, Lunaus, Ritters and Pingels.

In 1811 James Fenwick was keeping an inn at Cashel. He had a distillery in 1820 and may have been keeping one of the six shops in 1825. Two or three of these were probably on Yonge Street. Of the rest one was at Markham Mills and one may have been John Boyer's at Stouffville.

NUMBER OF INHABITANTS RETURNED BY THE
TOWN CLERKS OF THE HOME DISTRICT
PROVINCE OF UPPER CANADA,
TAKEN IN MARCH, 1809

TOWNSHIP	Men	Women	Males under 16 years	Females under 16 years	TOTAL
Town of York	195	162	137	83	577
Township of York	175	126	167	150	618
Scarborough	34	24	44	38	140
Etobicoke	32	27	34	44	137
Pickering	40	35	51	54	180
Whitby	63	43	42	45	193
Markham	294	234	320	263	1111
Vaughan	75	60	99	99	333
Whitechurch and Uxbridge	123	127	258	218	726
East Gwillimbury	79	69	149	128	425
West Gwillimbury	13	12	29	20	74
North Gwillimbury	16	15	18	24	73
King	45	30	58	42	175
Toronto	37	26	65	47	175
Trafalgar	55	45	71	62	233
Nelson and East Flamboro'	80	70	75	70	295
West Flamboro'	55	52	109	98	314
Beverley	26	23	55	37	141
Block No. 2, G.R.	64	48	71	58	241
Number in 1809	1501	1228	1852	1590	6171
Number in 1805	1080	870	985	849	3784
Increase	421	358	867	741	2387

CHAPTER 3
TRANSPORTATION TO 1856

1. Water Transportation

Water transportation was of the utmost importance in Upper Canada until 1856, and after the building of the first railways its use declined very gradually. Landings and harbours on the lakeshore helped to determine the course of the main roads and the site of some villages. The absence of landing places west of Highland Creek was one of the reasons for the slow development of Scarborough Township. The fact that boats could be taken some distance up the Rouge had an effect on the settlement in Markham. If the presence of good landings and some not too good harbours did not produce rapid settlement in Pickering and the east part of Scarborough, they did at least help such settlement as took place before 1805.

The harbours were at first of little use for sailing vessels because, like most inlets on the shores of Lake Ontario, their mouths were closed by sandspits*, formed as much by wave action as by alluvial deposit by the streams. This did not prevent the use of the rivers by boats of some size, but kept schooners to exposed anchorages outside. The landing place on Duffin Creek is said to have been near the railway bridge, not far from Roger's Mills. We are not told how far boats could go up Highland Creek; probably they could be taken close to Cornwell's Mills, just below the old Dundas Street bridge. This was a great advantage to settlers bringing their grist. The French document quoted below says the Rouge was navigable for two leagues or about five miles, probably for bateaux as well as canoes. Berczy says he took his "bateau" four miles up the river before he was stopped by logs and other obstructions.

* These are shown on the plans of Scarborough and Pickering Townships in 1796.

Four miles up the present windings of the Rouge would be close to the bridge in Lot 5, Concession III, in Scarborough Township and five miles close to the western side of Lot 6 in the same concession. There was a landing place in Lot 6, Concession III, in 1796. These estimates are probably accurate for the length of the easy navigation when the river was in its natural state. Canoes could probably be taken far beyond this point without too much trouble, but Indians and furtraders usually preferred to carry from free water on one river to free water on the other. They did not care to be continually carrying over beaver dams and small rapids.

Sometime after 1800 Berczy wrote to someone who was in York in September, 1794 giving a long account of his (Berczy's) improvement of the Rouge River and his proposal for a canal to the Upper Holland River. This account was in print before 1893 and easily accessible to the public.* The part referring to the Rouge is too long to quote in full. Berczy says that when he was exploring Markham Township "for the purpose of laying out the roads" he came to "a river, which was afterwards called the 'Nen'," at a point "in a direct line eighteen miles distant from Lake Ontario". He says he found that for some distance upstream to the north-west the river was deep enough for "large boats or bateaus". He then went "without delay" to York and went "in a bateau" along the shore till he came to the "third river". Berczy thought this large enough to be the Nen and found the inlet deep enough for schooners. He went up about four miles in his bateau.

".....I was prevented by fallen timber and drift-wood from persisting in my navigation. I, therefore, left my bateau, and continued to follow on

* Published in the Toronto Telegram and reprinted in J. R. Robertson; Landmarks of Toronto, Series 3, pp. 18-21. No indication is given of the source, and addresses and date are omitted. The spelling, etc., has been revised. The letter was not to Simcoe, Russell or D. W. Smith. It may have been to Major Aeneas Shaw, Captain Samuel Smith or some other military officer who took charge of the Berczy settlers while Berczy was delayed in Queenston by sickness.

foot the shore of the river until I came in the evening of the second day to the very same place where at first I had met this river. Having observed all along the way that it continued in a gentle course, to keep without interruption the same depth as at first I observed, and having afterwards continued to walk along it for about 20 miles higher up to the north-west, I observed it always capable of a good navigation."

Berczy then says that he told Simcoe that the river seemed to him capable of being made navigable almost to the Holland and that the short portage might be eliminated by a canal. He says that Simcoe "very anxiously encouraged" him to attempt to clear the river and offered him a tract at the outlet of the Nen on which to build storehouses if he made a harbour there. He says that "early in the spring of 1795" the "Deputy Surveyor of the district" gave him a Location Ticket for these lots and that he was urged* to make a wharf and build storehouses. He was canny enough to put off doing this until he was sure of his title to this land and was told to go ahead with the clearing of the Rouge. By the beginning of July he had cleared the Rouge.

".....so far that I could pass upon it for about 24 miles, from the lake upwards, with a boat of about a ton burthen....."

There are some difficulties in accepting this account. Whatever method is used to measure 18 miles in a direct line from Lake Ontario, the point where Berczy met the river, would be a little above the Victoria Square Sideroad and not very far from Yonge Street. This is a likely enough place for Berczy to be exploring, but it would be impossible to walk twenty miles farther up the Rouge to the north-west or in any other direction. As the whole river is less than 28 miles long, he would have to start from not more than eight miles from the mouth. Box Grove is about eight miles from the lake and Berczy's farm at Unionville about eleven. It

* The wording of this passage makes it doubtful who did the urging and wished to use the wharf. It was probably Simcoe not, as Berczy seems to say, the Deputy Surveyor.

might well take him more than a day to struggle along the banks of the river to one of these points. From this he might well think he had walked twenty miles to above Headford. Twenty-four miles up the Rouge would make Berczy take his boat well above the Victoria Square Sideroad and nearly 800 feet above sea level or nearly 255 feet above Lake Ontario.* This is the branch of the Rouge meant, for it was here that Berczy "disposed" his settlers to aid the clearing of the river as he says he did. The Little Rouge was outside his settlement.

D. W. Smith wrote to Augustus Jones on July 17, 1795, telling him to complete the survey of Scarborough between York Township and the River Nen. This order certainly was connected with Berczy's clearance of the river. So was the instruction to look for 230 acres on the Rouge that Simcoe could take to complete his military lands.† Simcoe did not patent these lands, but the rush to take additional lands in Scarborough may have followed the improvement of the navigation. Certainly most of the land near the Rouge was taken by absentees.

The lands Berczy wanted at the mouth had been given to someone else. He found this out when he went to Niagara to get a proper Location Ticket from the Surveyor-General. Simcoe, however, intended to give him Lot 34, Ranges II and III, in Pickering Township (about 230 acres**), and a "small point" of about 20 acres at the mouth of the Rouge in Lot 31, for his "trouble in opening the river".

* For more exact distances and elevations see the "Water" section of this report.

† Simcoe had already taken a block of land on the Humber near Weston through which ran the trail he had followed to the Holland in 1793. Iredell was sent to survey this block directly after Simcoe's return. His notes give two points on the trail.

** This may have been the lots reserved for Simcoe. Simcoe's intention is mentioned by D. W. Smith in 1798.

The new navigation may have proved of little use. In 1796, when Berczy was collecting provisions for his settlers, he was evidently anxious to control landings at the natural head of navigation. He wrote to the Surveyor-General about this on September 22, 1796. David William Smith replied on the 27th:

"I have received your Letter of the 22nd Inst. The Lots No. 2 in the Second Concession, and No. 6 in the third Concession of Scarborough, having been represented to me as good Landing places, on the Nen, those were the Lots I kept for you; I have now entered them in Wm. Eadus's name as you desire."

William Eadus, Eadies or Eades patented these lots in April, 1797. It should be observed that the "Old Masting Road" reached the river not far from the lower of these landings.

The "proposed canal" appears on some maps of 1805-12, perhaps based on information furnished by Berczy. As the Headford branch was evidently the one intended to be followed, it may have been proposed to join up Philips, Bond, Wilcocks and St. George Lakes and use them as part of the scheme. Much less is heard of this proposal in later years than of the one from the Humber to the Holland (or Schomberg) River. It may have been examined in the 1820's, when many canal routes were under consideration, and rejected as too expensive or because of lack of water - as much in the Holland as in the Rouge.

Almost nothing has been recorded in writing about the navigation of the Rouge; as far as can be judged it was not much used by settlers. There are traditions of boat and scow navigation as high as Steeles Avenue on the Little Rouge. However, the Reesors are said to have brought their goods in waggons up the river road. The existence of this road seems to point to a downstream navigation. This is often meant when a river was said to be navigable for boats and barges. The rafts or rough scows might be sold for lumber at the end of the trip or, if it seemed worth while, the boats or scows could be teamed back with the timber-tugs used for bringing large timbers to slack water. Slides for logs

and rafts were supposed to be left open in mill dams, but the dams spoiled the upstream navigation. In any case it was a toilsome business, and as soon as there was a road it was given up.

2. Indian Trails

In a region so thickly settled by Indians there were bound to be many Indian paths crossing the area. These would change little from the earliest times, for in the matter of trails and camping places the Indians were obstinately conservative. They could travel anywhere in the forest, but unless they saw good reason for it they preferred to follow the accustomed route. In this way the great trails would become clearly marked and the paths connecting villages be used long after the villages had vanished.

(a) The Lake Trails

There were three great paths across this area - the two lakeshore routes and the Rouge portage trail. There were two lake trails because of the impossibility of crossing the rivers near their mouths when the ice was thin in spring or autumn and the necessity of swimming or wading in summer. Indians were usually good swimmers, but deerskin does not take kindly to water. It was easier to take a route from one ford to another than to stop and make a canoe. The inland route would be safer from enemies coasting along the lakeshore in canoes. From Burlington to Toronto the course of the inland path is easy to trace. It was used for parts of Dundas Street and was marked on maps. Part of it is still followed by Davenport Road in Toronto. It crossed the Don near Pottery Road and probably climbed up to Todmorden, but from this point there is nothing to indicate its course except the line taken by Jones for his "horsepath". This will be discussed later. If Jones was influenced by the Indian route, the latter probably was heading for the village near Bendale.

From Bendale the inland path probably followed Danforth's road until it crossed the path from the mouth of

Highland Creek. From this point it is idle to speculate as to the line of this path. It is not likely to have crossed the Rouge as low down as Danforth's bridge. There is no well-defined bluff for it to follow, as there was until it reached Poplar Plains Road in Toronto. This is true of its course across Pickering. No road following it lasted long enough to be recorded on the rather late maps, which are all we have of this section. Dundas Street was straightened out along a concession line just where it might have rejoined the Indian path.

The lakeshore path probably ran close to the Kingston Road. There was little point in keeping closer to the lake across the Highland. It probably went back to the shore at Highland Creek and then followed the lake, as the Lakeshore Road does still east of Newcastle. We know that this road once continued across the front of Darlington Township, on land, some of which has been eroded away long ago. No sketch plan of Whitby and Pickering Townships has been found like the one of the front of Durham County made by Samuel Street Wilmot in 1829. Goessmann's plan of 1824, which is one of the same set, leaves Scarborough blank and we do not know what "bye paths" were travelled in that township.

(b) The Rouge Portage Trail

The trail from the River Rouge was, until 1678, as frequented as the Humber Trail and continued to be used by the Indians after the latter had become the established route for most white men. Though a little the longer of the two, this portage led over easier country, and for travellers intending to coast eastwards along the north shore it had the advantage of shortening the dangerous lake navigation, making it unnecessary to round both the peninsula (Toronto Island) and the Scarborough Bluffs, which once extended much farther into the lake. Travellers to and from Niagara or the Head of the Lake would find the Humber Trail more convenient for the same reasons.

It is just possible that some adventurous Frenchman may have gone with Indian bands over the Rouge Trail

between 1615 and 1630. This route was probably safer for small parties than the Trent, which was the favoured war path for Iroquois raids on Huronia. As the attitude of the Iroquois to the French gradually hardened, both Hurons and Frenchmen were entirely excluded from Lake Ontario. In 1635 Father Bréboeuf speaks of the route as "unfrequented" and Father Lalémant six years later implies that it was impossible to use it to Montreal.

During the years when the French were excluded from the Toronto Portage, there was nothing to prevent the Dutch from using it. They became thoroughly familiar with this route and later passed on their information to the English when New York became a British Colony. By that time an uneasy peace had been established between the French and the Iroquois and it was possible for the former to ascend the St. Lawrence. It was now the Rouge Trail that attracted the attention of the explorers and usually appears on their maps. Most of these give few details that are of help in determining the course of the trail. Two maps, of about 1674, attributed to Joliet, give more information. They show that this trail began a little way up the river, where it was flowing from the north-west or west, and led off nearly at right angles to the valley. Raffeix's Map of 1688 has the rivers drawn on a far larger scale than the rest of the map and gives some interesting details, probably intended as a guide to travellers. It shows the forks of both the Holland and the Humber, but unfortunately not those of the Rouge. The bend in the river is clearly shown and the beginning of the trail some distance above the village of Ganatsekiagon. The trail is shown ending on the East Branch of the Holland some distance above a sharp bend to the west. That the trail ended as high up as this latter point is possible but unlikely for, as a rule, the Indians preferred to carry straight from slack water to slack water, avoiding even the first rapid. But, like the Humber Trail, the Rouge route had probably more than one starting point and termination.

Raffeix gives the length of the trail as "15 lieues" or leagues. If the league is taken at its later length of about $2\frac{1}{2}$ miles, this is far too long for the distance from one river to the other. It is closer to the distance from one lake to the other. But apart from the difficulty of estimating distance in bush country, the length of the "computed league" varied as widely in seventeenth- and eighteenth-century Europe as the "computed mile" in different parts of England at the same period. Raffeix's estimate is much closer than Gallinée's of "20 or 22 lieus" (20 to 22 leagues). A description of 1730 says:

"It is 15 leagues from Quinté (Carrying Place) to the River Camestiagon. At the mouth of the said river there used to be an Iroquois village; after them the Mississaugues; the said river is navigable for 2 leagues; at the end there is a portage of 12 leagues through good country of low hills. The route is northerly and at the end of 12 leagues is the River Escoyondy. The said river runs north-east about 10 leagues and falls into Lake Toronteau..."

This has been accepted as referring to the Rouge Trail. The description of the portage is accurate and the length not far out for a carry to Holland Landing from a point five miles by river up the Rouge; but the distance given from Quinté suggests that the writer was confusing Ganatsekiagon with Ganaraske' (Port Hope) and his information about the Holland was vague.

This description shows that the trail continued to be used in the eighteenth century and it is shown on later maps. From the introduction of sailing vessels into Lake Ontario in 1678 the French preferred to use the Humber Trail because it had better anchorages near it. The founding of posts at Niagara in 1720, at Toronto in 1729 and again in 1750-1 confirmed this preference even for the Indians.

The Mississaugas were probably using the Rouge Trail after 1793, and it has been said that some of Berczy's Germans reached Markham by this route, but this was not the case with the main body, who went by Yonge Street. Berczy's probable connection with the settlers' Rouge road will be discussed later. The line of this road, as shown on the first map

in this chapter, probably comes as near to the line of the old portage as any that can be laid down at present. It must be remembered that these trails had alternative routes and many branches. The trail would certainly pass near the two villages near Steeles Avenue. It probably passed between them, for Indian villages were apt to be a little off a main trail.

(c) Local Paths

That a trail led up the east bank of Highland Creek from the mouth is indicated by the existence of the settlers' road later established for a time as a legal road. This with its probable continuation is shown on the first map. There are some Indian finds that confirm the idea of this path.

David Thomson was certainly following an Indian path when he made his way to the spring near Bendale, whether he was aware of it or not. This led from the lake to the recently discovered Indian village site and it continued on to the village site at German Mills, on to the Don Trail near Yonge Street and beyond into Vaughan Township. Here there was another concentration of Indian sites south of Maple. Some of these may have been sugaring camps and it was in this region that the remains of a "deer fence" are mentioned by an early surveyor. It must have been an important path and probably had many branches. The road that replaced it is marked on the map.

We know less of Indian paths in Pickering. One probably led northwards up Duffin Creek. It will not have been a main route, for there were better routes on both sides and the ridges are at their highest in the southern part of Uxbridge. Wherever there were beaver there would be paths, and many must have led across this country also.

The Stouffville Road to Uxbridge, on the other hand, looks like a fairly important trail. It would be a branch of the Rouge Trail and perhaps a short cut to the Trent system. The old road that connected it to Newmarket may have

used Indian paths in part also. The lakes and beaver ponds in the ridges would attract hunters, and this region would be safer than those nearer the lake when the Iroquois began to be dangerous.

The French used the lake trails for winter couriers between the forts. The British did the same until roads were made. Even the highroads owe something to the Indian route. For the settlers the trails were the easiest way into the back country. They drove cattle over the lake-shore trail and up the Don and Rouge Trails, and where it suited them they made waggon roads. Few of these have endured; landowners do not like slanting roads across their lands. But the old roads are not all forgotten and they help to show where the Indians travelled.

3. Roads and Travel to 1900

The roads in the early period fall into three classes: first the highroads or highways, made and largely maintained by the Provincial Government; second the roads opened by settlers for their own convenience, often with little regard to the surveyed road allowances; third the roads "by law established", selected by the magistrates in Quarter Sessions or by District Road Commissioners and maintained by statute labour. These classes later tended to merge into two - County Roads and Township Roads. Provincial roads in this region disappeared for more than fifty years to be revived in this century. As the population grew, more and more roads were established on the road allowances and most settlers' roads went out of use. By the 1820's the Government had established the practice of giving help to the commissioners for improvement of main roads not provincial property. The commissioners began, even earlier, to let contracts for main roads, leaving statute labour to the townships.

The order used above is roughly the order of date, since Yonge Street was the first road to cross any part of the watersheds, but all three classes were in use soon after 1800.

(a) Yonge Street

The line of Yonge Street had been surveyed from Holland Landing to Eglinton Avenue by Augustus Jones in February and March, 1794. In May, Alexander Aitkin was sent with a party of the Queen's Rangers to lay off the lots on each side and cut the road. By May 18, 1794, they had opened four miles north of Eglinton, at a cost of £5.19s.7½d. Cutting implied felling the larger trees and some clearing of brush, but little else. No bridges had been built. Such a road must have looked much like a township line in Northern Ontario today, or the right of way of a Hydro power line where it crosses a woodlot. Both these, however, are a good deal wider.

A little more progress had been made before August when the threat of war called the Rangers to military duty on the Niagara Frontier. By this time William Berczy had arrived with his settlers and in September he undertook to lay out Yonge Street "in the same manner as Dundas Street" and complete it within one year as far as Holland Landing. What this involved is described in a letter of Augustus Jones in reply to an inquiry from the Surveyor-General. It was less elaborate than Danforth's later contract, since there seems to have been the minimum of "causewaying" with logs. Brush and small timber was first cleared from a strip nearly fifty feet wide. Trees "under eighteen inches or thereabouts" were cut in the actual roadway "as near the ground as possible". Any larger trees seem to have been left standing. No grading is mentioned except some terracing with logs along hillsides.

Berczy had visited Yonge Street and reported at some length on the difficulties. He began work on October 24, 1794 and reported progress on November 30th. He says he has "finished on Yonge Street only till Lot No. 36", that is to Langstaff, where the road turned off to the German settlement.

"That Piece of Road from York to Johnsons I have a good deal altered, and till now reduced so far that

I could already send three Waggon's loaded with Goods & provisions till Johnsons. I keep an exact account of the Expences which I laid out on that Road, in order to make a Repartition of that work between the proprietors of the Lands, accordingly to the regulations of the Legislative Assembly. It was a great deal work to do, and I hope that with some not great Expences, that piece of Yonge Street can be entire perfected next Spring.

In the Township I have made about 30 Miles good Waggon Road, with all the necessary Bridges, of which some are from 30 to 70 feet long, so at present we have a very easy communication through the Lands, where the Germans has already built more than 40 Houses. All the abovementioned work on the Road was likewise performed by my Germans, to whom I joined only 6 other hired Hands. All the rest of my hired hands being employed to build a Saw-mill, the House at York and a large frame House for me in the Township."*

He had said earlier in the letter that he would continue beyond Langstaff as soon as things were settled in the township.

".....the more as I have already begun to build, and clear on Lots No. 53 & 51 East of Yonge Street, of which the Settler opens now the Road so far as to bring through a Sleigh."†

The part from Lot 29 to Holland Landing, "which I have engaged to open on my own Expences", he would finish as soon as possible.

At that moment Berczy was at the height of his optimism about his operations. He was only able to open the road as far as Bond Lake and even that distance was unfinished. He was stopped there by sickness among his workmen and other troubles. By midsummer it was obvious that he would not be able to fulfil his contract. He had been promised four lots on Yonge Street, which had been reserved to pay for opening the road, and because he was thought to have done his best to carry out the undertaking, the council recommended that these be sold and the money applied to Berczy's expenses.

Yonge Street remained as Berczy had left it for six months. Then, between January 4 and February 14, 1796,

* Survey Records, Lands and Forests: Letters Received, No. 3, pp. 709-711. Berczy to D.W. Smith, November 30, 1794.

† Ibid.

Augustus Jones with a party of 30 Rangers "opened" the whole road, cutting the trees and making some improvements. These probably did not go beyond the method he had used on Dundas Street. Berczy seems to have done some grading of hills and his road to Langstaff probably was a passable waggon track. Beyond that point Yonge Street was not much more than a "winter" road until 1798. The Government carried out a number of improvements in that year, partly because of the difficulty of sending stores to "Windham" for the French Royalists. These chiefly concerned the "Road to Yonge Street" below Eglinton Avenue, but work was also done on the rest of the road and by 1799 the waggon road extended at least as far as Aurora. Settlement on upper Yonge Street was going ahead rapidly in 1798-1800. By 1801 Timothy Rogers and his Quaker "followers" had arrived on their holdings between Newmarket and Holland Landing. The whole road was probably passable by 1802 and Yonge Street was really "opened" at last.

Each time a party was sent to do anything to a road they were said to be "opening it". Yonge Street was "opened" four times before 1800. The cutting required from settlers was also called "opening" the road. This use is confusing for modern readers. At first, it would appear from Berczy's letter, the settlers on Yonge Street were to contribute to the cost of the road, but by November, 1794 cutting half the road allowance of 66 feet in front of their lots and burning the logs and brush was all the "road work" demanded from settlers on Yonge Street. Stumps were to be cut so low that a waggon might pass over (the axles, not the wheels) and as Berczy indicated this produced little more than a sleigh track. After 1798 this duty applied to all lots not specifically freed from it. It was better enforced after 1800 and an inspection in 1801 showed that the part of Yonge Street from Richmond Hill to Bond Lake was better cleared than most of the rest. The first "opening" of a government highroad was usually little better than cutting a line, but more was

expected of contractors. The settlers were not relieved of all duties when a highroad was "opened", for the width of the strip was reduced after 1794 and they still had to clear the verges.

In 1804 the Legislature passed a bill to provide for the improvement and maintenance. In 1807 it was suggested that Yonge Street be "turnpiked". This usually meant clearing out boulders, stumps and large roots, and ditching and crowning up the road with the plough. It was probably carried out before long, for traffic on the road was steadily increasing. Greater opportunities for profit and stricter enforcement of road duties were inducing some absentee landowners to move from York to Yonge Street between 1802 and 1812. This is reflected in the numbers of tavern licences issued.

In 1805, four taverns were licensed on Yonge Street. The number gradually increased and in 1812 eight new licences were issued, bringing the number to about twenty on the street and two in Markham. The war proved the utility of the "military communication". Most of the stores for the naval posts on Georgian Bay went by Yonge Street, Lake Simcoe and the Severn River. The dirt road probably suffered from the increased traffic, but Yonge Street was one of the highways for which special funds were voted in 1814 and by 1816 Yonge Street was one of the best roads in the Province. The traffic was said to have declined since the introduction of steamboats on Lake Erie, but the dust from the many waggons was annoying to a pedestrian.

In spite of the revival of the Niagara route, the demands on Yonge Street grew steadily as the northern townships were settled. The road was probably kept up to the standard reached by 1816, but great advances in road construction had been made in England after 1800 and these were being adopted in the United States. Yonge Street was falling behind contemporary standards and more and more complaints of its condition were to be heard after 1825.

It was obvious that the roads were inadequate, particularly Yonge Street on which the summer traffic was much heavier than on the others. In January, 1830 Seneca Ketchum, James Hogg and other inhabitants of Yonge Street petitioned the Assembly for leave to set up a Road Company, raising the capital by loans on the security of the tolls to be collected. The scheme was investigated by a Committee and it was agreed that a system of tolls appeared to be the only way of keeping the roads in condition. However, there was some unwillingness to set up private companies on the "military" roads and the committee reported that it might be a useful experiment

"to allow a sum sufficient to macadamize four miles of that road to be expended, and afterwards to place a toll-bar with moderate rates of toll for two years, within a mile of York".

The tolls were to be let by auction and the profits to be applied to the upkeep of the road "under the direction of the freeholders in the vicinity".

The scheme was not carried out exactly as recommended. Funds were granted in 1833 and Rowland Burr was given a contract for improving Yonge Street. Burr graded the hills by means of cuts and embankments across some valleys. He followed the straight survey line and the old detours became alternative roads. Most of them passed gradually out of use. This grading was considered at the time a marvellous achievement as it was in preparation for macadamizing, but this progressed very slowly. In 1837 Yonge Street was only macadamized as far as Yorkville, where the first toll gate stood at Bloor Street. The rest of the road is described as "tolerable", but "in good weather" should be added. In December, 1837 much of Yonge Street was still in a very bad state.

In 1836 trustees were set up for the highways of the Home District. "For the Yonge Street Road" seven were appointed. They were empowered "to erect such number of Gates on or across the said Road...and fix such toll as may be found expedient...". There was probably already at least one toll gate on Yonge Street, for one on Dundas Street is mentioned

in the Act. Others were now set up farther up Yonge Street and the macadamizing was carried on during the next ten years. By 1846, when the Provincial Government had taken the roads back from the Trustees, the "stone road" reached to Richmond Hill.

Up to 1841 the Government had spent more than \$400,000* on the three "Toronto roads" - that is, on Yonge Street to Holland Landing, the "West York Road" (Dundas Street, No. 5) as far as "Springfield" (Erindale), and the "West York Road" (Kingston Road, No. 2) as far as the Rouge.

All three were toll roads and in 1846 brought the Provincial Government a gross revenue of about \$10,245. Expenses were only \$300 in that year, but as the improvements were pushed farther up Yonge Street and traffic in all the roads increased, the expense multiplied faster than the receipts. In 1848 the gross revenue was about \$49,775, but expenses were so heavy that the net receipts were only \$9,335. In 1849 the receipts were greater and the expenses somewhat less, so that the average for 1846, 1848 and 1849 is about \$11,000, and this is probably close to the yearly average from 1845 to 1850. Both receipts and expenses would be greater on Yonge Street than on the two other roads.

In 1850 the three main roads were sold to a private road company for £75,100. This did not recoup the Province for all expenditures, but seems to indicate that profits were expected to increase.

"Whether the Government has acted wisely in so doing remains to be proved; the roads were formerly in the hands of Commissioners, and many persons were of the opinion that the Government acted without much judgement in taking them into their own hands. They were certainly very badly managed, and whoever loses by the present transfer, the public at all events are likely to be the gainers, as they will never submit to pay tolls to private parties for travelling on such bad roads as they have been condemned to use for the last year or two."[†]

* W. H. Smith: Canada, Past, Present and Future, 1851.

† Ibid.

This last seems to refer to stretches on Dundas Street and the Kingston Road, for the same writer says in another passage that, with these exceptions, the roads of the "Upper Province" were on the whole very good in 1850. The macadam road now extended to Holland Landing.

Whether or not the public gained by the sale of the road, the purchasers were almost certainly losers in the long run. The opening of railways in 1853, 1855 and 1856 reduced the tolls on the roads, and when the County of York purchased these three roads and also the Lakeshore Road in 1865 the gross yearly revenue was only about \$32,000 for all four. The purchase price was then fixed by arbitrators at \$72,500 - less than a fifth of the price of 1850. The County continued to collect the tolls, farming out the various gates to the highest bidder.

The tolls were never popular. They were evaded whenever it was possible to use a **sideroad**, and in this way the improvement of the sideroads, which were free, was hastened by the existence of the toll gates. Pressure was put on the municipalities to improve the free roads and people did their statute labour willingly, paid their commutation, with less grumbling when it meant having an alternative to the toll roads. The system of tolls was certainly the only one that could have produced the sums needed to bring the main roads up to the modern standard of 1840. It survived in York County long after other methods had been found successful elsewhere and was only abolished in 1896.

(b) "Dundas Street" - Old Danforth Road and Kingston Road

Simcoe had conceived a single road from the Thames to Kingston, with a branch road from Burlington to Niagara, in 1793. It was to be one of the great military roads of the province and was called "Dundas Street" after Henry Dundas, Viscount Melville, in 1793 Home Secretary and in 1794

Secretary at War. The first section of Dundas Street was opened from Coote's Paradise to the Thames in 1793. On July 18, 1795 D.W. Smith gave Augustus Jones instructions from Simcoe to

".....open a Horse path from York to the Bay of Quinte, as a Ground work for the continuation of Dundas Street, you will proceed upon this work, as soon as you have completed the Survey Westward of the River Nen.

In tracing this Road, you will have general regard to the proper Situations for its crossing the Creeks, which His Excellency conceives will be at about 2 Concessions distant from the Lake, in the several Townships - leading off & on that Concession line as a base or direction according to the Nature of the Ground, Creeks &c. so as to make the whole as near a right line, as the Curve of the Lake will admit - and should you find any difficulties to this object, in your progress, you must be guided by existing circumstances on the spot, having especial regard to the principal view, namely of continuing Dundas Street towards Lower Canada by the shortest and at the same time most eligible route".

The survey mentioned was the one in Scarborough already referred to. Pressure of work kept Jones from carrying out this commission until at least the latter part of 1796. He evidently began his line at the point where "Coon's Road to St. John's" crossed Yonge Street, that is near the present corner of Roxborough Street East. Why he went so far north-east before crossing into Scarborough can only be guessed. It is not likely that Jones did much cutting along this line or that a horse path (bridle path) was opened or used. However, the existence of Jones' line influenced the course of the road of 1799, and for this reason it has been entered on the first map. From Duffin Creek eastward the road departed very little from this line and until very recently Queen's Highway No. 2 followed it even more closely. Some detours around hills were straightened about 1850.

In March, 1799 the Executive Council considered a proposal from Asa Danforth for opening the whole of Dundas Street to the River Trent by contract. Asa Danforth was an American contractor who had successfully exploited salt springs and had been concerned with some equally successful mills at

Rochester. He had had a good deal of experience in building roads. He asked twenty dollars an acre for a road cleared 33 feet wide, taking four acres to the mile. The Council accepted his proposals with alacrity, only changing the price to \$20.50 per measured acre and adding a few details to his proposal.

"Council Chamber 9 April 1799
(received 9 August 1799)

(An Extract from
the Minutes)

Read the Proposals of Mr. Asa
Danforth for opening a Road from York to the
Mouth of the River Trent, thirty-three feet wide.

Labour to be completed as
follows -

To be surveyed and marked at the Expense of
Government. Mr. Danforth will then proceed to cutting
& clearing the said Road, taking care to cut sixteen
feet and half within the 33 feet, smooth and cut even
to the Ground, and as near the center of the road as
the Ground will admit, and the Bridges & causeways
shall be made in such way & manner, as shall be
allowed sufficient, taking care to place the Buttments
& string pieces a proper height to prevent the high-
water from taking the covering off. The Bridges
& Causeways to be the same width of the cleared
part of the Road, or 16 feet & $\frac{1}{2}$ wide, and such
places as are sideling, and such as are too steep
for passing, are to be plowed down a proper space
for Slay or Carriage to pass; and that the above
labor shall be done the first day of July 1800.
The Road shall be passable to Smiths Creek by the
first day of January next.

Labour & Expences, calculated as follows -

Twenty two Dollars & a half for each Acre, said
Road shall contain.

Payments in the following Manner -

When Ten Miles shall have been inspected, receive
payment for five.

When Twenty Miles are completed, receive payment
for Ten Miles, and when the Road shall be finished
to Smiths Creek, receive payment for one half of
that distance.

The Remainder, when the whole is compleated.

(signed) Asa Danforth

Unanimously approved

(signed) J. Small

The Surv'r Gen'l"

The Surveyor-General was told to send a Deputy Surveyor to fix the line for the road. He was to start from the end of King Street (near the present junction of King and Queen Street East) and to be given discretion to depart from line laid down when necessary to avoid "wet grounds and Ravines" but was to follow it in general. The Surveyor-General issued instructions to John Stegman on April 29, 1799 and added the rider

".....a Road forced into Scarborough by the Exertions of a few Settlers, is to be an object of your research, as I think it possible that may prove a favorable situation for the Highway - but should this appear never so eligible, your opinion on it, must not be concluded until you have explored the other parts of this Tract".

Stegman was to blaze this line and then survey it marking the 33 feet of width. Danforth was allowed very little discretion to depart from it and was even expected to keep his road in the middle of the strip. He was allowed to locate 200 acres in the name of "each good and industrious labouring man" employed and to draw three tents and two grind stones from the public stores, "as they are articles that cannot be obtained without much trouble and expence".

Stegman had finished as far as Duffin Creek by June 10th, 1799 and reported

"The road forced into Scarborough have fount to be Eligible, according to the nature of the Country, for which reason have made no alterations except where I fount it necessary to make the Road shorter, the Distance from this town to Duffin's Creek, has been carefully chained & mile posts erected, and the greater part of the said road is on a pine ridge & a favourable Situation for a high Way excepting a few hills which were impossible to avoid.....".

After a little prodding Danforth began work early in August and worked rapidly. He was reported to have reached Smith's Creek (Port Hope) by November 27, 1799. William Chewett had inspected the first ten miles about November 8th and three weeks later he set out to inspect the whole to Smith's Creek. In the first ten miles Chewett had noted several items that must

be "ammended" before Danforth could be paid his first payment. Chewett's full report was not entirely favourable but he did not put all the blame for this on Danforth.

" The Hills in general are too steep and must be ammended, but the contractor has followed the Line of the Surveyor, who should have staked of (sic) parrallels in a Zigzag manner up the face of the Hills, in order to make the ascent, and descent easy for his guidance. The Hill on the East side of the River Nen, which is the most difficult to pass on the whole of the Communication, the Contractor has taken as much pains as lay in his power to make good, but with all that he has done, or can do it is too steep. I saw a loaded Ox Sled go down with ease, but then there was from 16 to 18 Inches of Snow on the ground, to go up this Hill in my opinion Carriages must unload, and when the said Hill is covered with a glair of Ice, I doubt much whether Oxen, or Horses to Carriages could either go up or down, yet I am induced to think that a Chain across the Runners of a Sled, or a Wheel Stopped by a Chain might answer, but to be hoisted or lower (sic) by a Tackle would be much better. I therefore conclude it to be a good Winter Road, as a loaded Sled drawn by Oxen, may travel from 16 to 17 miles per day, and a Sled with Horses from 35 to 40 miles per day, that is to say from the break of day, to the parting thereof.

" But with regard to a Summer Road for Wheel Carriages going Post - In my humble opinion nothing can effect that but a good Settlement thereon to keep the Road in constant repair, by cutting out the fallen logs, Timber, and the Brush which will grow up at every Stump, and in every part of the road."

This passage has been quoted at length for the picture it gives of conditions on a better pioneer road, conditions that still prevailed to some extent on Yonge Street where the beam for hoisting and lowering heavy waggons could still be seen across a cut below St. Clair Avenue about 1832 and gave its name to "Gallows Hill". Chewett implies a good deal of criticism of Stegman (probably of his inexperience) and of the Council for trying to make the road without taking steps to see that it was settled and for giving the contractor too little discretion. He says they can not lose by paying Danforth for half the 63 miles, as otherwise he cannot continue. Except for the hills the faulty parts could be set right in the spring.

There were only four settlers on the road in 63 miles and a few new improvements near Smith's Creek. On July 20, 1800 Lewis Grant found some things to be done, including three miry places to be corduroyed near the tenth mile (south of Bendale) and the bridge over the west branch of Highland Creek near the point to be raised as Mr. David Thomson said the water had run over it that spring. These had been done when Grant inspected the 63 miles a month later and Grant gave a favourable report. The "precipices or sudden descents" had been cut down and zigzagged with log retaining walls.

The road could now be described as passable and was certainly better than none; but the Council was not satisfied and Danforth had difficulty in getting his money. Possibly there had been complaints from the "inhabitants". Settlers were beginning to locate along the road and they had been doing some repairs. Two or three "causeways" had been built "by the inhabitants" by 1802. A committee of three had been appointed to report on the road and estimate the cost of putting it in shape. They reported on October 2, 1802 that Danforth had not fulfilled his contract and gave a long estimate of repairs totalling £2100 (Currency - \$8400). Their remarks certainly show that the road was going to pieces.

" The East end of the Bridge over the River Nen or Rouge, the string pieces having failed, will in a short time be impassable.

Many Bridges & Causeways are in the same predicament.

The Eastern Hill at the aforesaid Bridge, the upper part of the log work having been burnt by the late fire in the Woods, will in a short time be impassable.

The Communication in many places from the 18th Mile Post to the Trent is almost impassible being overgrown with Brushwood & Brambles, and many Trees which have fallen since it was first opened except where it is settled."

It was very little settled; this report names three settlers in the first thirty miles - Palmer at the 10th mile post, Jones at the 12th and Munger near the 23rd. The

second report, a month later, adds George Post between the 16th and 17th and Mr. Woods near the 26th. There were at least two or three more on the road in this area. Some faint attempt was made to enforce settlement and road work. It was unsuccessful; everyone had unimproved wild lands and no one wished to invoke forfeiture against their neighbours. Councillors like David William Smith were among the worst offenders.

An estimate of £2,100 was too high for the Council to allow. The committee was given £300 to spend. They prepared the second estimate on this basis. They proposed to spend £25 on the Don bridge and £50 to build a frame bridge at the Rouge and another £50 for the hill east of this bridge "being a very dangerous precipice". This money was spent in 1803-04. On September 14, 1803 William Chewett writes to a contractor who had offered to build a new bridge over the Rouge at a place suggested by Samuel Munger north of Danforth's bridge, and to Munger to learn the details of the location. Two days later he writes again to Munger, as pathmaster of Pickering, for estimates of the cost of clearing the road across Pickering and Whitby and of replacing "the two Bridges which have been carried away between your House and the River Rouge" - Petticoat Creek and Dunbarton Creek.

The Legislature voted funds in 1804 to be spent on repairing roads and bridges. This Act changed the course of Dundas Street in several places but not in this section. In 1806 the Road Commissioners for the Home District advertised for tenders for work in aid of statute labour on Dundas Street. A similar advertisement appeared in the Gazette of June 9, 1810, soon after another more general Act had received the Royal assent. This call for tenders specifies the townships of Pickering and Whitby, indicating that the Cornwell Road was in use across Scarborough Township. This advertisement is repeated again about eleven months later. This time the work is to be done without statute labour.

The Cornwell or Front Road is said to have been opened by William Cornwell in 1800 by contract at the cost of \$1100. At that time Danforth's road was not finished and there were no Road Commissioners to let a contract. It seems more probable that this is a misprint and that the work was done under the Act of 1804 instead of improving Danforth's road. This road was at once preferred and the Danforth Road fell out of use. The traffic in 1812 to 1814 was extremely heavy. Troops were continually passing over the road with guns and baggage and quantities of stores were teamed over it when the enemy was in command of Lake Ontario. The roads were destroyed and in 1814, while the war was still going on, the Legislature was forced to make a grant which was to be used only for repairing Dundas Street.

The Commissioners for the Home District were placed in a difficulty. They found that Dundas Street was the Danforth Road, that parts of it were so overgrown that to clear it would cost almost as much as a new road, that in any case it would be more expensive to repair than the Front Road and would not make so good a road. They placed these facts before the Governor in 1815 in a memorial supported by a petition of the inhabitants. They asked to be allowed to spend some of the money on the Cornwell Road "(which has been established according to law)". This was allowed and from this time the Cornwell was regarded as the highway. It was already being shown on maps of 1813 instead of the Danforth Road. It began to be called the Kingston Road and the name "Dundas Street" was dropped east of York.

In 1816 the Kingston Road was a reasonably good dirt road. It continued to be improved from time to time and in the thirties the part west of the Rouge became one of the "York Roads" in the 1830's. The Rouge Bridge and hills continued to give trouble. The bridge was out in 1829 and the only ferry was a small canoe, paddled by an even smaller boy.

Waggons had to be "swum" across, their watertight boxes keeping them from sinking. A good deal of money was spent before 1841. In 1843-44 the Kingston Road was planked and macadamed as far as the Rouge. In the next few years the hills were carefully graded, a new bridge built and the plank road carried to Rouge Hill. This section had become a toll road in the 1830's. The rest of the road seems to have been treated as an ordinary District or County road. It was not gravelled until after 1860, when most main roads were gravelled if not already macadamized. It remained a pretty good gravel road until 1919 when widening and grading began in preparation for paving. Since then it has been Highway No. 2, until the building of No. 2A and 401, the main highways east from Toronto.

The Danforth Road remained in use as a travelled road from the Kingston Road to Woburn. It is mentioned in 1829-31 as the termination of certain roads from Markham, though these probably continued beyond it. In the fifties a plank road, the Don and Danforth Road, was made along what is now Danforth Avenue and connected with the Kennedy Road using part of the old "Danford Road". This was not extended beyond the Kennedy Road and the rest of the Old Danforth Road remained a country road, the part beyond Woburn being used only by local traffic. Some of it is still in this condition today. It is not likely to remain so long and before it is altered a marker might be placed to record one of the oldest roads in Ontario.

(c) "Duffin's Crèek to Newmarket"

A "Schedule of Roads in Upper Canada" made for the Lieutenant-Governor in 1821 lists another Government road in this area. In this list "Dundas Street" is called a "Highroad", Yonge Street and a number of other roads running north and south are called "Crossroads". They are roads opened by Government and among them is "Duffins Creek to

Newmarket". This road was evidently opened to connect the various Quaker settlements in Whitchurch, Uxbridge and Pickering Townships. The road was probably opened in 1808-09 and improved as a Government road under the Act of 1810. It ran fairly directly from Dundas Street near Duffin Creek to Uxbridge Village, but probably did not conform as closely to the survey before 1830 as the Brock Road does now. Maps of 1809-13 show it starting from the left bank of the creek and at first inclining a good deal to the north-north-east. These maps are to a very small scale, sometimes badly drawn and without township lines so it is hard to say whether this was actually the original line.

From Uxbridge the road swung to the south-west to a point near the site of Stouffville, and then ran north-westerly to the Lundy settlement near Pine Orchard. Then it ran westerly to Newmarket and Yonge Street. The dip towards the Markham Townline shows plainly on the 1813 map and the direct road from Pine Orchard to the Ninth Concession east of Lemonville was still in use in 1851. By then the lower part had been straightened along this concession, but earlier it ran more directly to Stouffer's Mills. So did the Stouffville-Uxbridge Road. By 1829 this road had been continued through Brock Township to Thorah Township. A grant of £15 was made in 1829 "in aid of the road between Thora and Markham, leading through Brock and Uxbridge". The road from Duffin Creek came to be called the "Brock Road". The maintenance of these roads seems very soon to have been turned over to the District authorities, with occasional "grants in aid" such as were made for other main roads, not opened by Government.

(d) Settlers' Roads

There were many of these unsurveyed roads before 1812. The ones shown on the first map are those for which some evidence exists besides tradition and which were certainly or probably in use as travelled roads in 1817. For

the roads in Markham in 1817 the evidence is reports on roads, mills and churches or meeting-houses, made by James Miles, James Fenwick and George Mustard, and a plan of Concessions I-IV, made by James Miles to illustrate his report. To confirm these there is the report made by John Goessmann, D.P.S. in December, 1824.

Miles gives more "bye roads" than Fenwick or Mustard; the two Captains seem to have considered trails that did not follow the survey of no interest. Miles remarks that besides those shown

".....there is many temporary Roads or paths from one neighbour to another accrost their lots for their own convenience and frequently shut again up as best suits them. Some of the Principal ones I have doted on the sketch which I have drawn of the Township according to the best of my Knowledge and for the other travelled roads I have made a large mark though at the creeks and bad places they Vary from the Straight line".

Miles reports a road from Yonge Street along Steeles Avenue almost to Bayview Avenue "and from there acrost lots to the German Mills". He shows a road a little north of German Mills "acrost lots into Scarborough"; there is other evidence for this road in connection with a disputed landmark in the 1830's. It may have been opened by Norman Milliken when he was operating these mills around 1805. In 1808 some inhabitants of East York and Scarborough petitioned to have the Dawes Road (Victoria Park Ave.) opened because they could not get to German Mills. The by-road connecting this road with the mills was surveyed by David Gibson in 1829 and 1831 and established in a straightened form as a legal road. Gibson's first survey used more of the old road and gives us its general line. The road as surveyed in 1831 is still in use as a public road.

There is evidence for the connection by part of the Kennedy Road with the old trail by Bendale and Agincourt in 1817, but this "Ridge Road" should have been shown continuing in a direct line towards German Mills and Yonge

Street, for later some evidence was found that the part in York Township was in use in 1837. The great anchor now in the Holland Landing Park is said to have been teamed up this road in 1815. There are conflicting traditions, but this seems not improbable for the anchor was brought in the winter of 1814-15, if it was abandoned at Soldiers' Bay when the news of the peace was announced, and this would be a possible shortcut in winter from the Kingston Road to Yonge Street. This road followed an Indian path and markers should be placed at Bendale, Agincourt and Steeles Avenue to record its existence. Before this is done the line should be better established, if possible, than it is on the map.

The road from the mouth of Highland Creek (now called in part "Old Danforth Road") was surveyed in 1833 by John Farquharson, Superintendent of Highways, as far as Concession IV in Scarborough. At that time it was only required as a connection with the Markham Road, but there is some evidence that the old road continued directly to Unionville. This road was "confirmed and ordered to be opened at the General Quarter Sessions of the Peace, 28th February 1833". It had been closed by 1861 if not earlier.

The road up the Rouge is the most interesting of these roads but tracing it is made difficult by the fragmentary evidence and by the fact that the traditions of signs of old roads in the area south of Cedar Grove point out the existence of several roads or trails along the Rouge and Little Rouge. These traditions are reliable but those gathered cannot be combined into any one road. The early maps, and especially the fine map published by C. Smith of London, England in 1813, all show a main road running from Dundas Street at Rouge Hill, north-west at a little distance from the Rouge to a point somewhat east of the centre line of Markham Township where it meets the road across that township from Yonge Street. As has been mentioned, the scale is too small for

accurate detail of roads and rivers, but the map is well drawn and seems to be based on accurate information obtained from America.

That this road continued to the mouth of the river is indicated on some maps and by the fact that a small part across Lots 34 and 33, Range III, Pickering Township, was surveyed by Farquharson in 1841 and "confirmed in court 7th Oct. 1841 no opposition being made". There are reliable traditions for a road through Lot 2, Con. III in Scarborough as shown and for a road across Lot 1, Con. X in Markham. The section past the mills at Cedar Grove to Lot 5, Con. IX is still open at each end on nearly the old line. A sworn certificate dated 1808 for settlement duty on Lot 7, Con. IX of Markham says "that a good Waggon road is cut through the centre of the said lot". There is a tradition that the line of a road could be observed across a woodlot on the north-east corner of Lot 10, Con. VIII. Anyone looking at Tremaine's map of York County, 1861 and familiar with the names of Mennonite families in Markham Township would be convinced that the trail continued north-west on much the line shown, but there is some confirming evidence of this. John Goessmann in 1824 reports and shows on his map a road from Holter's grist mill on Lot 26, Con. VII to the front of that concession at Lot 29. The road has been carried on to the Townline near the site where an early Baptist Church was built some years after 1817; it could not unreasonably have been continued to Peter Brillinger's in Concession V of Whitchurch and on up the Fifth Concession Line.

It seems very probable that there was another road on the right or western bank of the Rouge and that it crossed the river and ran between the two branches. This is not the one shown on the maps and no evidence has been collected as to its course. The "Old Masting Road" certainly ran down the ridge between the Rouge and Little Rouge and

Wellington Hotel — Markham Village—built by Capt. William Armstrong about 1830 — destroyed soon after 1900.



Courtesy of Markham Township Corporation.

Old inn at Goodwood — Uxbridge Township. As there were no houses on this road in 1831 this inn will date from about 1840—Michael Chapman was innkeeper and postmaster at Goodwood in 1857.



Old inn at Ringwood — Markham Township.



reached the Rouge near the Forks. The great squared timbers for ships masts were teamed down with timber tugs - pairs of wheels with their axles arranged so that the sticks could be supported at each end. They were then floated down the river and made into rafts for the trip to Kingston, where the rafts were reassembled for the trip to Quebec. However the great days of this trade came after 1825 and there was not much masting before 1817.

(e) Legal Roads

All the surveyed roads eventually became legal roads except where they could not be opened because of natural obstacles and a good many were open in 1861 that are partly closed today. In the first days of settlement, however, the amount of money or labour available for the roadwork was limited. It has been shown that some of it was applied to the highroads. The use of statute labour and public money for roads was determined by the magistrates in Quarter Sessions and after 1804 by appointed Road Commissioners for each District. Statute labour was carried out under pathmasters elected at the yearly township meetings by the freeholders. As settlement grew and more labour was available the number of roads on which work was done was increased. These roads naturally became travelled roads and a good many are reported in 1817 and a few more in 1824. The ones travelled in 1817 are those shown on the first map, with one exception to be discussed later. Goessmann's report of 1824 does not change the pattern to any great extent. By 1835 a great many more roads were passable, but those most travelled remained the same. W.H. Smith shows a selection of travelled roads in 1850, but Tremaine does not make any distinction from ordinary roads in 1861 except for those planked or macadamized.

There is much less information about such roads in Scarborough and Pickering before 1840. A road from Markham to the Brock Road is shown in 1813. It probably

followed the Fifth Concession Line in 1817 and may have continued to the other Brock Road in Whitby Township. The Eighth and Ninth Concessions are mentioned as having been opened by settlers in the wrong place (north of the line surveyed) before the survey of Uxbridge in 1805. They had probably become travelled roads by 1817. They would connect with a travelled side road in Markham and serve as roads to the Markham mills and to connect groups of Quaker and Baptist settlers with similar groups in Markham and Whitchurch. For the same reasons it seems likely that the Eighth Line of Markham was probably continued through Scarborough. This was certainly the case in the 1820's. There would be many more roads that would be opened after a fashion by settlers along the road allowances but they are not reported even as by-roads. Captain George Mustard said that there was "almost nothing done" on the Ninth Concession of Markham in 1817.

Lieutenant James Miles does not show the road between Lots 10 and 11 as travelled across Concessions IV and V in 1817, nor does Goessmann in 1824. George Mustard says this road was passable but may mean only from Concession VIII to the Townline. However this is the road opened by Berczy in 1794 from Yonge Street at Lots 35 and 36 (now Highway No. 7). This is shown as continuous to the Brock Road in Pickering in 1813. The map shows this road curving considerably to the north and this may mean that travellers made a circuit to the north for some reason and returned southwards farther east. This is what is indicated by the 1817 and 1824 reports. Goessmann in 1824 takes the travelled road up the Fifth Concession and along the Mountjoy Sideroad to the Eighth. He shows only this short part of the Fifth as travelled and Fenwick omits it altogether. It must have been used before 1817, if not much travelled by non-residents.

Berczy says he opened 30 miles of road by the end of November, 1794; he had no reason to open the road from

Yonge Street beyond the Fifth Concession. Jones mentions this road in 1796 and no other in Markham leaving Yonge Street farther south. Berczy probably opened a road from it to German Mills and perhaps parts of other concessions. It is not easy to account for 30 miles of road in the Township in 1794. Berczy may well have opened the road down the Rouge in 1795-96 when he was clearing the river. The accounts of the arrival of later settlers seem to indicate a road that waggons could pass by 1803.

After 1825 it became the practice for the Legislature to make small grants in aid of District roads. Grants of this sort were made to repair "the road from the eighth concession of Markham to the Danford road" in 1829 and for improving the "Kennedy road", again to Markham and for improving the road between Lots 34 and 35 in Scarborough "from the four mile tree, on the Danford road" to Markham in 1831. The Second Concession through Whitchurch and Adelaide was improved as a main road in 1827 and named "the Queen Street" in honour of Queen Adelaide. It was a good road in 1850.

Before 1849 road companies could only be formed by special Act of Parliament. In 1849 an act was passed to make this possible without special legislation. The Markham Road was planked by one of these road companies about 1850. The work was probably finished by May, 1853 when Thomas A. Milne paid Peter Milne (Jr.) £66 on behalf of the Markham and Scarborough Plank Road Company. Later the Victoria Square Sideroad was macadamed by a similar road company.



Old house in Markham Village near Milne's Mills—probably built around 1830. Although much repaired this house shows the length and low eaves of the early type. The end windows retain their small panes. Some houses were built here after Milne's store was opened in 1824.



Farmhouse Lot 5, Con. X, Markham — occupied by the Dimma family since before 1840. Dimmas have lived here since before 1836. The house probably took on its present appearance about that time, though there are signs of two stages of building.



Truman P. White's house Whitevale — probably built about 1845, when Truman White moved to "Major" now Whitevale. Such small panes were growing old-fashioned in the 1840's but persisted in this area. The added leanto helps to balance the doorway.

CHAPTER 4

UNREST AND DEVELOPMENT - 1825-1867

1. The Completion of Settlement

Until after 1812 the number of settlers of British origin in this area had been comparatively small. Only a few individuals had come to the watersheds direct from the British Isles. The most notable exceptions were the group of Irish Quakers who have been mentioned as settling in Pickering Township. Most of the settlers of British birth before 1816 had already lived for longer or shorter periods in other parts of British North America or in the United States, like the Mustard brothers in 1801-02 and the Milne brothers in 1824.

After 1815, however, the number of immigrants to Upper Canada from Great Britain and Ireland steadily grew. Before 1830 a large proportion of these settlers were men of some substance, induced to emigrate by the pressure of changing conditions at home. These men were able to buy improved land from the original owners, to build houses and mills and to set up businesses at likely locations. The cash which they paid for their purchases was a welcome addition to the small amounts of ready money accumulated during the war years. Many more of the early settlers or their sons built mills about 1820 or opened taverns and stores. Almost all of the mills in Markham in 1825 belonged to families established in the township or the town of York, or to Canadians from other parts of the Province. The price of wild land was rising and even more in proportion was being paid for slightly improved farms. An account of settlement in Scarborough, written in 1847 says:

" From 1805 till 1814 good land in the township could have been bought in the township for seven shillings and sixpence per acre - and from 1814-1824 for fifteen shillings - but after that there

"was a great immigration for several years and land rose rapidly".*

This probably refers to land on which the settlement duty at least had been performed; such land in Markham was probably a little higher. A Pennsylvania "Dutch" settler bought such a lot of 200 acres in Vaughan in 1806 for £100, or 10 shillings an acre, but this lot contained a "millseat" though a mediocre one. In the Home District in 1823 the average price of wild land was found to be 10s. per acre, and this became the upset price when the Crown Lands began to be sold by auction a little later. Uncleared land near Newmarket was reckoned in 1833 to be worth \$3.00 or 15 shillings Currency an acre. Improvement would raise the price in proportion to the amount carried out. Prices in Markham would be similar, for the Newmarket area was reckoned very desirable for settlement. Prices in Pickering would be rather lower in 1805 but by 1820 they would have improved. By then the township had been opened up to a considerable extent and between 1825 and 1840 a great many new settlers located there. In Scarborough a Clergy Reserve inspector in 1845 estimated that 14 reserves, scattered through the township, were worth unimproved from 15 to 30 shillings an acre; but only David Thomson (Lot 25, Con.I) and James Maxwell (Lot 12, Con. IV) were willing to pay the full price listed for their lots.

Settlers of moderate or small means could buy land at these prices because both the Crown and private owners were accustomed to take the price in three or more instalments. Patrick Shirreff in 1833 thought this system of more advantage to the seller than the settler, at least in the case of wild land,

* Ontario Archives; Miscellaneous Manuscripts, 1796. "A few historical notices regarding the Presbyterian Congregation in Scarborough and the first settlement in the Township". The manuscript appears to have been written in 1846-47, possibly in preparation for the dedication of the new church, but some names of communicants were added up to 1874.

" There is never any hesitation in selling land to a man without capital, as the rights of it are withheld. Every tree which is cut down enhances the value of the property, which is unproductive while they are standing. When a settler absconds after some years' residence, a case by no means rare, the proprietor derives great advantage from his operations. An agent to a very expensive and wild property, informed me he had sold twenty-five lots of land, consisting of about 6000 acres, and received in all of purchase-money £300".*

Shirreff thought the system plunged the settler hopelessly into debt and that the high prices it made possible were retarding settlement as compared to the United States, where Government land was sold at 6s. 3d. Halifax Currency (\$1.25) an acre. However, this scientific Scottish farmer had a low opinion of Upper Canada and wished to induce British settlers to go to Illinois in spite of the much longer journey and even more primitive condition in the prairies. Like many Scots of that time he thought poorly of land that was covered with trees.

Nevertheless, settlers had been coming to Upper Canada in steadily increasing numbers since 1818 and in 1830-32 the immigration reached its first great peak. From 1825 more of the newcomers were poor, often without the few hundred pounds that would set them up on a bush farm and make it unnecessary to find work during the first few years after they reached Upper Canada. During the 1820's there had been a large immigration from Scotland and Northern Ireland, some of it by way of the United States. By 1830 the Southern Irish were beginning to form the majority. Failures of the potato crop had brought distress and local famine in some parts of Ireland and many of these immigrants were destitute on landing. Those who were not going to Government-assisted settlements worked their way up from Montreal and swelled the labour force in the Home District. A good many of these Irish workmen

* Patrick Shirreff: A Tour through North America, 1835. Shirreff went up Yonge Street to Newmarket in 1833. The estimate of the price of land in that neighbourhood is also taken from his account.

signed receipts in Peter Milne, Senior's, book in the 1830's and 1840's. They seem in many cases to have moved on to take lands in new areas; but the accounts of "early" settlers in all these townships often begin by saying that the family came in the 1830's after working for a time elsewhere, and then took the farm on which the immigrant or his son was living as a prosperous farmer 50-60 years later.

The less prosperous immigrants who wished to settle in the area leased farms on a share system, set up as craftsmen in the clearances where hamlets were growing up, or found employment on the large farms, in the mills and other new enterprises. A great change was coming over the watersheds in the 1820's and 30's. The older inhabitants were aware of this. To the Reverend Isaac Fiddler's landlady at Thornhill it seemed in 1832 that she was living in a different country from the one she had known, peopled entirely by unsympathetic strangers. This was an extreme view; the families of 1801 were still very much in evidence on Yonge Street and in Markham they continued to hold many of their Crown grants for at least another generation. To the younger generation and many of the new arrivals the rate of progress seemed all too slow. They grumbled about the state of the roads, the delay of some owners in clearing their land and the effect of the Reserves in retarding settlement.

As far as this area was concerned this last complaint had little justification by 1830. The remaining reserves were all let before 1820. Many Crown Reserves were sold to the occupying tenants in 1826; the remainder were sold to the Canada Company or granted to King's College. The Canada Company sold its lots as soon as possible, allowing three years for payment. Those in Markham, Scarborough and Pickering were mostly disposed of before 1840, but the Canada Company owned a number of lots in Uxbridge Township in 1860 and a few in the eastern part of Whitchurch. Many of the

College lots were sold before 1835 and, though some continued to be rented for a time, the evidence is that the improvements on these lots were about as extensive as on those occupied by their owners. This also applies to the Clergy Reserves, for good tenants were not hard to procure in this part of York County. A large part of the Clergy Reserves were sold before 1845. Certain circumstances, however, prevented continuous settlement and preserved large stretches of forest. It was the custom to clear only a third or half the farm and to place these clearings on the frontage of the concession roads. For this reason the sideroads often ran through considerable stretches of bush and the presence of occasional unoccupied lots limited the settlement on the concession to separate "clearings" containing from ten to fifteen houses. These averaged about a mile wide and usually stretched for a mile or less on either side of a "corners", where there might be a tavern and smithy and perhaps a church or schoolhouse. A grist mill generally attracted settlers and stood in a clearance, but sawmills were often "back in the bush".

The war had entirely checked the flow of "Dutch" immigrants from the United States. An Act passed during the war made it illegal for Americans to acquire land in Canada and this was not repealed until 1829. Unnaturalized aliens could not vote or sit in the Legislature. The position of those born British subjects before the Revolution was a matter of debate for some time. Before the war it had been possible to argue that they could resume this status if they had given no definite adherence to the new Government. But this claim was rejected after 1815 even before it was definitely settled in a test case in the late 1820's, based on an earlier judgment of the Privy Council. The German element in Markham was not much extended by immigration after 1815 (as it was in Waterloo and Wellington Counties), but it was considerably increased by the expansion of the families already in the area.

These were now in a position to buy more land and the younger generation often preferred to settle in the district. By 1825 they had already begun to settle in the adjoining townships and this went on to a greater extent up to 1860.

The population of Markham Township was over 4,000 in 1833 and with more than 5,000 in 1837 it may be considered to be fully settled. Such a population would be large for a purely rural township at a much later period, when the village population was much larger than it can have been in 1837. The population of Pickering Township was large for the period, but was about 2,000 less than that of Markham and left room for much further settlement. Scarborough Township, with a smaller area, was by 1837 about as well settled as Pickering. There were still some unimproved lots but few vacant Crown lands and almost no unoccupied Reserves. There was a large undeveloped area in Whitchurch Township, but the part drained by the Rouge and Duffin Creek was as well settled as most of the township and not much behind Markham.

It was apparently after 1833 that there began to be any real settlement in the vicinity of Goodwood and Glasgow. Most of the names given as those of early settlers in this area belong to families already established for a generation in Whitchurch, Markham or Pickering Townships - Widdifields, Mordens, Milliards, Vanzants, Munros, Millers, Longs, Browns and, later, Sharrards. Elisha Miller, who is mentioned in 1907 as a survivor of the early settlers near Glasgow, was born in 1813 and was living in Pickering Township in 1836. This settlement was chiefly in the south-west corner of the township. East of the Brock Road settlement seems to have been scanty until after 1840 when the Sharrards began operations at "Glen Sharrard" (Glen Major). Even in 1860 there were some non-resident owners in this section. There cannot have been many settlers by 1837; the whole population of Uxbridge Township was less than 600, mostly concentrated farther to the north-east.

It will be seen from the table that the population of Uxbridge Township increased rapidly after 1842 but was still comparatively small twenty years later. The large gains in the other township between 1842 and 1851 and in the next decade were only partly due to the occupation of vacant lands. In Markham they are accounted for partly by subdivision of holdings, which was also going on to some extent in Scarborough and Pickering, but a great deal of the gain was due to the growth in the number of families who held little land. These were chiefly, but not entirely, to be found in the villages and hamlets that were growing steadily more populous. Some were farm labourers, most did a little farming or farm work as a secondary occupation, but a great many were engaged in some form of industry or in commercial work. After 1850 this began to apply to Pickering and Scarborough, and even, to a lesser extent, to the parts of Whitchurch and Uxbridge in these watersheds.

POPULATIONS OF TOWNSHIPS - 1823-1861

Township	1823	1825	1832	1835	1842	1851	1861
Markham	2255	2371	3578	4349	5698	7752	8658
Pickering	675	830	1718	2642	3752	6737	8002
Scarborough	634	758	1562	2047	2750	4244	4854
Whitchurch)	1291	1476	1951	2454	3836	4758	6795
Uxbridge)			337	431	810	2289	3933

Populations 1823-35, from assessment returns made to the Legislative Assembly by the Clerk of the Peace for the Home District.

Populations 1842-61 from the Provincial Census for Canada West.

For all these townships except Uxbridge the populations returned in 1861 are the largest recorded before 1921. They must be taken with some reserve for the Census of 1861 was acknowledged to be inaccurate. However, the error is not likely to be large enough to change the general picture. The greater part of this area was near a temporary peak of

population in 1867, and even in Uxbridge settlement was practically completed.

2. The Troubles of 1837-38

Dissatisfaction with the administration of the province was not uncommon before 1812. It produced occasional outbursts of opposition that sometimes went beyond the legislature. In these agitations the inhabitants of Markham Township sometimes took a prominent part. A large number of names connected with Markham, and a few from other parts of the area, appear on a petition criticising Lieutenant-Governor Gore at the time of his departure for England in 1811. However, the signatures on this petition are open to some suspicion. On examination it appears that the same name is repeated more than once, and that several settlers in Markham sign with their mark who probably were quite well able to write their names.

Before 1817 this opposition was directed against particular policies of administration and against supposed favouritism on the part of the Governors. There was no organized demand for a sweeping program of constitutional reform. The prominent objectors were usually members of the governing class, often officials, and some of them were influenced by private grudges or family feuds*. Several of them went over to the enemy during the war which brought their ideas into disrepute for a time. The war also affected the official group, and made the new generation more determined to retain its control of the administration and deny any influence to "radicals", which for them meant much what "bolshévick" signified a century later.

In the 1820's, however, demand for reform was part of the spirit of the times, as strongly agitated in Europe, Britain and the United States as it began to be in

* Such as those of Joseph Willcocks in 1802-12 with his cousin, Peter Russell, and of Robert Gourlay in 1817 with his cousins the Dicksons and Clarks of Niagara.

Upper Canada. The opposition found new leaders among the British immigrants. In particular, William Lyon Mackenzie, a Scottish immigrant, after some unsuccessful attempts as a businessman, started a newspaper at Queenston, the "Colonial Advocate", which he made the organ of the dissatisfied group. A definite Reform Party came into being, and in 1828 first obtained a majority in the Legislative Assembly. The parties were, however, not unevenly divided. Before 1850 the Reformers seldom retained their majority for more than one Parliament. They had other leaders besides Mackenzie and in political opinion were divided into three main groups. One, probably the largest among the voters, was unswervingly loyal to the British Crown. It had come to believe that constitutional reforms, placing power in the hands of the elected Assembly - Responsible Government, were the only hope of redressing grievances and securing good government. Another, which tended to grow larger in the 1830's, would accept self-government under the Crown; but came more and more to favour an independent republic, and to regard constitutional reform as hopeless. A third small, but influential group favoured union with the United States. These people were at first astute enough to keep their intentions more or less secret. The Tories were more united, but they also included a large group of moderates who were anxious for reform in such matters as land granting, the school system and the arrangement of roads, but rejected agitation for responsible government as disloyal and dangerous.

The Reformers were strong in the Home District, where their leaders were well known. The father of Robert Baldwin*, leader of the first or moderate group, owned the mill lot at Buttonville in Markham Township. Mackenzie had

* Dr. William Warren Baldwin, also a leading reformer, He had inherited this property from his father-in-law, William Willcocks. It later came to the Hon. Robert Baldwin himself. See below Chapter 5.

many ardent supporters in the northern part of Markham, in Whitchurch and Pickering. He had come to represent the more extreme Radical section of the party. These supporters included recent arrivals and members of long-established families, even some of Mennonite origin like Ludwig Weidman of Ringwood. The stricter Quakers, Mennonites and Tunkers held aloof. They might vote for Reformers, but their principles enjoined submission to the magistrate in indifferent matters and forbade any form of violence. As we shall see some of the Baptists in Pickering took a more conservative attitude. The Lutherans in Markham had been incensed by a disgraceful attempt to make them Anglicans by stealth. The Methodists were the most active in attacking the management of the Clergy Reserves, but were more divided on secular reform. However, the parties did not represent any particular group, class or locality. There were plenty of Tories in Markham and some Orangemen, the most violent supporters of this party. In Scarborough the Tories seem to have been numerous, but in Pickering the influence of Peter Matthews and his family and connections was strong on the Reform side.

By 1833 the less moderate Reformers were becoming impatient. The heavy immigration of the last few years had brought them some supporters, but on the whole had done more for the moderates and still more for the Tories. Most of the immigrants were of British origin and, for one reason or another, were at first inclined to support the Government against the opposition. Something had already been done in the 1820's to remove some of the pressing grievances. This had as often been the work of the Government or of moderate Tories as of Reformers. It did not satisfy the demand for reform, but there was some danger that if the Reform Party could not retain control long enough to force constitutional reforms, the other grievances would gradually be removed as the country grew more populous and prosperous.

This feeling of impatience was strengthened by the election of 1836. This followed a session in which the Reform majority had been able to pass some legislation implementing its program. The new Lieutenant-Governor, Sir Francis Bond Head, had dissolved the Legislature and now most improperly proceeded to identify himself with the Tory party. The Tories resorted to violence to break up Reform meetings and to intimidate voters at the election, they used, or were accused of using, other doubtful tactics, with the apparent support of the Governor. The Reformers were able to say and believe that they had been defeated not by votes but by clubs and fraud. Actually the result probably showed a genuine reaction against Reform. The violence and tactlessness of some of the leaders had alarmed the "neutral" voters and lost the party much support.

Meetings began to be held at which resolutions were passed advocating the resort to force. Rebellion broke out in Lower Canada and more resolutions were made in favour of giving this outbreak support. As the Tories continued to try to break up meetings by force, the Reformers armed themselves in self-defence. Mackenzie made a tour of the northern part of the Home District with guards of horsemen, holding meetings at which these seditious resolutions were passed. One such meeting was held at Stouffville on September 18, 1837, with Ludwig Weidman in the chair. William Doyle, the postmaster, had entertained Mackenzie the previous night. He now brought a rifle tied to a pole and placed it over Mackenzie's head saying

"..... he wished the Governor and the damned Tories were there to see it; and they would know by looking thereat what they had to depend on before the lapse of many months."*

After Mackenzie's speech the resolutions were passed, according

* "Spectator" in the "Patriot", 1837 - Quoted by Edwin C. Guillet: *Lives and Times of the Patriots*, 1938. Another account had appeared in the "Constitution" of August 23, 1837.

to this Tory account with a certain amount of difficulty.

Mackenzie was again in Stouffville on December 2nd, "delivering sealed letters to the captains of townships for December 7th". Sir Francis Bond Head had sent all the regular troops in Upper Canada to help put down the rising in the lower province. This had decided the Radical leaders to arrange a demonstration against Toronto for December 7th. Some of the leaders and a good many of their followers were allowed to believe that this was to be a peaceful show of strength, but some certainly intended that the capital should be seized, five thousand stand of arms taken and the Government turned out. While Mackenzie was at Stouffville Dr. Rolph and Dr. Morrison moved the date forward to the 4th, and sent out instructions to the Township Branch Clubs to meet at Montgomery's Tavern (Eglinton Avenue and Yonge Street). This gave little time for assembly and the comparatively small force that met at Montgomery's was drawn chiefly from the Home District.

The story of the indecisive actions of the next three days is well known. The rebels made two half-hearted attempts to advance on Toronto. The first reached Yorkville, after being delayed by some fruitless negotiations with the Government. Later a party pushed as far as Wood Street, but was fired on by a patrol and retreated in panic. The defence of Toronto was being organized. A miscellaneous force was collected and armed. These were joined by 100* men from Scarborough under Captain McLean and by 65 other Militia Volunteers from the Head of the Lake, who came by steamer. Later some men came in from the townships west of Toronto. On December 7th a force of 920 men was ready to march up Yonge Street.

* "Past Years in Pickering" has "400", but as this was almost the whole population of Scarborough in 1837, this must be a misprint.

Captain Peter Matthews and about sixty men were sent by the rebels to make a feint against the city from the east. Many of these were probably from Pickering. They stopped the westbound mail and set fire to the Don Bridge and toll house. Advancing beyond the bridge they met a militia patrol and retreated hastily, setting fire to other buildings as they went. Some of these fires were put out and the bridge was not burnt. Meanwhile the main body had been defeated near the Paul Pry Tavern (Davisville). They had stood long enough to have a few casualties. Lieutenant Ludwig Weidman was killed and one of the Shell family wounded at the same time. About ten others were wounded and some died later in hospital. The rebels were outnumbered more than four to one and were badly armed and despondent.

Militia from other Districts were now marching to Toronto. They advanced as fast as they could over the heavy roads. Those who left Cobourg on December 7th, reached "Lee's Tavern" in Pickering Township on the 9th. At Bowmanville they had captured Dr. Hunter of Whitby, who had escaped one party of militia by hiding in the big oven at Gates Tavern near Scarborough. Peter Matthews had struck northward towards German Mills and taken refuge at the Duncan farm just south of Steeles Avenue. Unfortunately the party had taken a short cut up what was probably part of the Ridge Road. Their footprints in the snow were noticed by a Loyalist neighbour. He sent his daughter to borrow a darning needle from the Duncans. When she reported strangers in the house, he informed the authorities. Matthews and his party were surprised in their beds and after some resistance were handcuffed and marched off to Toronto.

The militia now spread out through the country, seizing arms and horses, searching cupboards and attics and probing haystacks for lurking rebels. A good many of those actually engaged in the rising escaped, but in the Home

District a great many were arrested on suspicion. Some had had nothing to do with the rising and were released after being examined. A large number were marched through the snow to Toronto. Some of these were also soon released, but others were kept in gaol on short rations until the general amnesty in 1838.

In the list of those arrested in the Home District are the names of a number from this area. Most of the men of the Wixon family from Claremont were arrested. As the Wixons were leading Baptists the following entry in the records of the Baptist Church in the Eighth Concession of Pickering is curious.

"Dec. 8th, 1837.

A Dark Cloud has for some Days Been suspended over the City of Toronto, Devoted to destruction by a misguided faction Led by the unprincipled McKenzie, the tool of a few influential Democrats. Today the Cloud had Burst and overwhelmed the Assailants with Confusion and Dismay. Prayer has been heard; the City is spared and we are called upon to Bless God that tho surrounded by the Disaffected not one individual connected with this place of worship Has taken any Part in their Rebellious proceedings and to Record our Humble Hope that Peace and tranquility may be speedily Restored."*

Either the Wixons had been wrongly arrested or there was disagreement between the church in the Eighth Concession and that in the Ninth in this matter. One group of refugees escaped by cutting a schooner out of the ice in Frenchman's Bay. Another including David Gibson, who had made his way across Scarborough and Pickering to Whitby Township, escaped in a schooner from the mouth of the Rouge.

A curious incident of the troubles was a panic that seized many of the inhabitants of the northern part of Markham directly after the fight at Montgomery's Tavern. The militia from the Simcoe District brought a small party of Indians with them on their march to Toronto. Rumour magnified this into a great band, coming to scalp and burn. This story was current in Tecumseth Township on December 6, 1837. A merchant named Joseph Walker, told

* W. R. Wood: Past Years in Pickering, pages 31-2.

this tale to a member of a survey party working in the western part of King Township. The man had been sent for supplies and on his return started a panic among his companions. They deserted the surveyor and fled to their homes. Probably some of these men brought the story to Yonge Street. There it was picked up by a youth who had been sent to the tavern on the site of Elgin Mills for news. This seems to have been on December 8th, when Ludwig Weidman's body was at Elgin Mills on its way to Ringwood. The boy carried this news to his home east of Gormley and that night the settlers in that vicinity gathered in two houses, one to the west and one to the east of the Bruce Mills, prepared to defend themselves and their families.

By morning the news was shown to be false; no ferocious Indians were being let loose on the countryside. But the memory of this alarm lingered among the families concerned and this tradition has lately been confirmed by the references in the Diary of Survey now in the Ontario Department of Archives.

Peter Matthews was tried with Samuel Lount for treason. As they pleaded guilty they were inevitably condemned to death. Sir George Arthur, the new Lieutenant-Governor, felt he was not justified in commuting the sentence, although he received petitions signed by thousands asking for clemency. These came from people of all parties; one deputation consisted of Egerton Ryerson, the leader of the Wesleyan Methodists, a moderate Reformer, and Charles Brough, an Anglican Clergyman of strong Tory views. Among the reasons given for this refusal was Lount's presence at the shooting of Colonel Moody and Matthew's conduct at the Don Bridge. They were hanged in Toronto on April 12, 1838.

None of the others condemned to death for their part in the outbreak of 1837 was executed, though some of those concerned in the later raid on Windsor were hanged.

The Home Government was inclined to be lenient in 1838.

Lord Durham was sent to report on the situation and late in the year issued an amnesty that pardoned most of the prisoners and allowed most of the exiles to return to their homes.

For this area the rebellion ended with this amnesty, for few or none of the inhabitants were concerned with the later raids. In 1841, after the union of the Canadas, the process of administrative reform was begun and carried on in the succeeding years. After the Great Session of 1849, little remained of the grievances of 1837, except the matter of the Clergy Reserves. Even this had been dealt with in the settled townships. The struggle for responsible government had gone on during these eleven years. As a rule this part of the Home District had elected Reformers, often men prominent in the party. Politics retained some of the bitterness and violence of the earlier period. However, elections in this section were not always so fiercely contested as they were in other ridings. In 1847 the eastern riding of York County returned a leading Reformer with a good majority while he was absent travelling in Europe.* The struggle ended in 1849 and after 1850 there was a new alignment of parties. Interest in political matters was as keen as ever, but the bitterness of party feeling had abated.

3. Life in the Area before 1867

In order to avoid repetition very little has been said of the daily life of the settlers. In many essentials life on a new bush farm differed very little in 1845 from the daily round of fifty years before. Besides in much of this area there was a tendency to conservatism in

* William Hume Blake, appointed Solicitor-General for Canada West by Robert Baldwin in 1848. Blake did not return until late in 1848. While in Paris he and his sons, Edward and Samuel Hume, witnessed the almost bloodless revolution that drove Louis Philippe, King of the French, from the Tuileries Palace.

customs, often deliberate and partly religious, that made the changes come more slowly than in some other areas. Nevertheless, it is a mistake to disregard altogether the changes that were taking place, and, as has often been done, to treat the whole period as one without any distinction of different phases of development. To quote from sources of the 1830's and 1840's beside those of about 1800, without any distinction of time or locality, tends to produce a confused picture. Such confusion is sometimes very apparent in the mounting of "pageants", in historical exhibitions and above all in "historical" pictures, when made without much study of the subject. It is more serious when restorations are attempted without the clear notion that what is "authentic" for 1837 may not be so for 1807 or 1817.

Owing to the great number of descriptions of Canada published between 1825 and 1850, this period is very well documented and the sources are easily found. It is not so easy to come at sources for the earlier period and the material is far less complete. Many of the material relics of the pioneers also date from after 1825. While, owing to the "time-lag" referred to, these may be valuable evidence for an earlier time, they must be used with discretion. Farming changed very slowly before 1840, but in other aspects of daily life the change was quicker. The first phase may be called the "frontier" period, the second the "backwoods" period. The frontier stage was almost over in Markham by 1820. It lasted rather longer in other parts of the area and was just beginning in this part of Uxbridge in 1835. In these sections the backwoods phase was correspondingly shorter. It was over in Markham before 1850 and soon after in most other sections of the area.

(a) 1800-1825

The progress of improvement was slow during the frontier phase. This was the time of the small clearing, full

of stumps; of the little log house, overshadowed by trees and often "two whoops and a holler" from the next neighbour; of farming that aimed chiefly at providing food for the family and was carried on more with the spade or the harrow than with the plough. It was a time when a shortage of deer or salmon meant a lean table; when wolves and bears preyed upon the stock, and passenger pigeons whose flocks darkened the sky threatened the little fields of grain; when the way to mill, church or store was a winding trail, almost too rough and narrow for a waggon, and the "highways" were more like wind-fall strips than roads. It was a time of toil and hardship, but even then there were some things that distinguished this area from those not far off and made life less difficult than it had been in the frontier settlements of ten years earlier, or than it was no farther away than Darlington Township at that very time.

Except Berczy's Germans, almost all the settlers in the watershed had owned farms in other parts of Canada or the United States and brought with them the value of this land in stock and stores or, more rarely, in cash. They also brought with them the experience of backwoods farming acquired in their former homes, and the inexperienced townsman, whether from Europe or the United States, was extremely rare in the York settlements until this phase was over. Even the Germans had brought more stock and had been given more supplies and equipment than were issued to the Loyalists in 1783. The latter had far less experience and when their supplies were exhausted an ordinary bad season brought a local "starving time" similar to the general one of 1789. The Pennsylvania settlers came with trains of waggons and with flocks and herds, though these were probably small enough.

When a few acres had been cleared a single good season could, under favourable circumstances, bring the farm into production and make the family self-subsisting. The fields

or "pieces" were small - 3 acres or less - so that ten or twelve acres would allow some variety of crops. A good location might reduce the amount of chopping. If the farm included some river flats, there were hayfields and pasture almost ready made and corn-ground that could be ploughed at once. Wheat would bring a little credit at the store to buy salt, ironware and gunpowder and a little cloth or linen if the settler had not yet provided himself with a few sheep and a patch of flax. If wheat was too cheap it could be made into whisky, for which there was a steady demand at York. No doubt some of the settlers had stills before 1812, licensed or unlicensed. James Fenwick and Abraham Reesor took still licences in 1820, but these were for the larger type, used by innkeepers or by millers and storekeepers who took wheat in toll or trade.

If the settler and his family were capable, the farm, after a few good seasons, could provide the raw materials for almost all their necessities. A few sheep and a patch of flax would give them cloth and thread. Buttons could be carved from wood or bone, or be moulded from lead like the bullets for their rifles. Hides and deerskins could be tanned or dressed to make shoes, gloves and even breeches, waistcoats or hunting shirts. Caps could be made of fur, and hats or bonnets plaited from straw. "Utensils" (the word then covered all the apparatus of house and farm) could be made chiefly of wood; iron was needed only for the points of spades and ploughs. Axeheads, knives and scythe blades had to be bought, as did a few pots and pans, but the settler could dispense with crockery if he was willing to substitute vessels of wood or bark.

Few settlers in this area were forced to be self-dependent to this extent. Most could afford to buy some crockery, a little linen, a felt hat and cloth for one best suit or gown at least. Homespun, however, was in general use. All housewives used the spinning-wheel, even Mrs. Simcoe, and

often wove the yarn themselves. In better-off households the homespun was used for work-clothes and blankets, but for most it was the only wear and among the Mennonites and Quakers homespun continued to be the usual dress for generations. At first all the labour of cleaning, carding and spinning the wool, weaving the yarn and fulling and dressing the cloth had to be done at home. Before long a few professional weavers were to be found in York who wove the homespun yarn in their own houses for so much the yard of cloth, but they were not numerous till after the war.

Where the clearing could not produce a surplus for trade, something could be made from the surrounding forest. Furs could always be sold and deerskins were often in demand. Like maple sugar, deerskin was apt to be too plentiful. There was as yet little trade in firewood, for the soldiers cut their own on the reserves and most townsmen got theirs from their farms. Ashes were perhaps the most reliable product of the woods. The settlers had plenty at hand; it took little trouble to collect them, and though the price might be low, the merchants were usually ready to take any quantity. Until stores and "asheries" were opened in the area settlers would have to take their ashes and other produce to York, or depend on merchants like Quetton St. George who sent waggons to the mills and on "horse pedlars", who also sometimes had waggons and would take produce in trade. There are stories that mention pedlars who made regular rounds in Markham and illustrate the shortage of cash, and especially small change, that plagued pedlars and customers alike.

Most settlers built their own houses, though this was less the universal rule in this District than elsewhere. Carpenters were available, for many crossed the lake in the summer, attracted by the demand for public and private building in York. There were contractors who would undertake to build a well-to-do settler's house and thus shorten the

time needed to fulfil settlement duties. Something has already been said about the size of these houses, and their assessment by "hearths" and by type rather than by size or cost. Until 1812 taxable houses were comparatively few in the country, although at first there seems to have been a class of round-log houses with more than one hearth, assessed at £15. This was high, for in 1841 a "comfortable log house" of one and a half storeys, 16' x 24', could be built for £12-£14. After 1818 dressed-log houses are returned as the lowest class. These were assessed at £20, with more for each extra hearth. Hearths included stoves, favoured by settlers of German origin before they were much used by the rest. Storeys appear to have been calculated by the rows of windows visible on the front. An attic lighted from the gables placed a frame house in the "less than two storeys" class. A medium house of this type cost £50 in 1841 and the price seems to have been little more in the earlier period. Two-storeyed houses of frame, brick or stone paid taxes on £60 and on £10 more for each extra hearth.*

Some early log houses are still standing in the area, mostly, like the old Lemon house in Whitchurch, concealed behind some later wall-covering. As might be expected these usually represent the houses built when the settler was able to improve his living conditions, but even so some date from before 1812. The exceptionally fine dressed-log house illustrated stands on land allotted by Berczy to Frederick Ulrich Emelius Westphalen. No house is reported on this lot in 1799†, so it seems best to assume that it was built by Philip Eckhardt in 1800-01, when Westphalen would be

* Prices in this paragraph and elsewhere in the section are in "pounds Provincial Currency" at five silver dollars to the pound, unless otherwise stated.

† There is a strong tradition that this house was built by Philip Eckhardt before 1799. But in 1799 the Eckhardts were living on Lot 7, Con. VI, south of Unionville and this lot, No. 17, was apparently unimproved. That Eckhardt built the house during Westphalen's ownership, by contract or some other arrangement, seems very probable.

contemplating applying for his patent. To do this there had to be a house on the lot and Westphalen probably arranged with Eckhardt to build it. He got the patent in 1803 and may have sold the lot immediately as many other owners did at that time. This house shows some peculiarities that may be due to Eckhardt's Pennsylvania origin. The house built on Eckhardt's original lot was of the more usual type.*

There was less opportunity in this early period to follow particular types brought from the settler's old home. All the houses were comparatively small and resembled each other in the essentials of their plan. One large room, with a very wide hearth, took up most of the space. One or two small bedrooms were sometimes partitioned off at one end away from the hearth. Above was a large loft or attic, doing double duty as a weaving and work-room, as well as a dormitory. If a "parlour" was required, the main bedroom might double as an eating- and sitting-room, but this would mean a second hearth. A few frame houses of one or two storeys would be found scattered here and there before the beginning of the war, but masonry of brick or stone was limited to chimneys and foundations.

These houses could be made comfortable by the standards of the time. A well-chinked log house, even of one room, was a warmer and drier home than the croft and cabin of the Irish peasant or the Scottish Highlander. It was easier to keep clean and sweet than the combined cottage and byre still to be found in the north of England. There was plenty of firewood; the great hearths threw off a terrific heat when well piled with "foresticks" and the great backlogs kept the fire going through the night. The "Dutch" settlers were used to stoves and some brought these with them, but stoves were

* This house was standing not long ago and a picture of it is in the Tweedsmuir History prepared by the local Women's Institute.

heavy and bulky to transport and expensive to buy in Upper Canada. The majority had probably to use the open hearth for a time, though as soon as they could they replaced it with the more efficient stove.*

The other arrangements differed little from those common to all but the richest and most luxurious. Comfort and cleanliness depended in those days on the expenditure of labour in the house, and small houses and large families put a fairly high standard within reach of most who desired it. If the houses were crowded and stuffy in winter and hot in summer, so were most houses of the time. They were well furnished (also by the standard of the time and class) before the early period was over. Inventories of losses during the war show that in more remote parts of the Province well-stored houses were not unknown. The carpenter-made furniture, now known as "Loyalist" was less universal than some people would like to think was the case. Many families had a few "heirloom" pieces and these could soon be supplemented by others of good quality made of native woods by cabinet-makers in York or brought across the lake. Pine would do for the kitchens, but for parlours and best bedrooms cherry tables and maple chests and bedsteads were the proper thing. The "Dutch" were noted for the neatness and cleanliness of their houses. They favoured an oldfashioned plainness in dress, which was sometimes due to religious convictions. In their furniture they would avoid costly ornament. However, they appreciated fine woods as much as their neighbours and the Mennonites used attractive traditional patterns to decorate furniture and textiles.

* Stoves were in common use in Lower Canada before 1759, but houses were usually provided with several open hearths. Until about 1840 it was usual to have one such hearth in the main room of the typical French Canadian farmhouse. By that time settlers of German origin were building houses with no fireplaces.

Until the School Act of 1816 the burden of primary education fell entirely on the parents. Melchior Quantz is said to have taught school in his neighbours' houses in the vicinity of German Mills. There were one or two very early schoolhouses on Yonge Street outside this area. A school is said to have been built on a corner of the old cemetery in Unionville, but the date is uncertain. However, J.P. Radenmuller signs himself "schoolmaster to the Lutherans in Markham and Vaughan" in 1810. Radenmuller had lived long in England and could teach in German and English. Similar arrangements were made in the other townships, members of a church often combining to provide some sort of teacher. There was a District "Grammar School" in York, but this was under control of the Church of England and, apart from the cost, would not appeal to most settlers. What schoolhouses existed could be used as churches. Although several congregations were organised before 1817, there seem to have been no church buildings until that year and ministers were rarely available for the denominations that required them.

The outbreak of war brought many changes. Men were called from the farms for active service or for transport and road work. The life of the countryside was dislocated, though the Government tried to lessen the evil, exempting some heads of families with only young children, releasing the men when possible to help with the harvest and using conscientious objectors for road work and transport. Quakers and Mennonites were exempt from fighting but had to pay for substitutes. The York Militia suffered heavy casualties resisting the landing of 1813, and after the surrender the Americans sent foraging parties up Yonge Street, requisitioned animals and supplies and, no doubt, did some pilfering. No serious plundering is reported outside the town and there were no systematic burnings of mills and houses as in the Niagara and London districts. Some inhabitants of the area were killed in action

in other engagements and the war brought the usual share of suffering, loss and inconvenience.

There were, however, some compensations. The demand for all kinds of produce was so great that the country could not begin to meet it. Prices rose steadily until they had to be "pegged" before the war was ended. Naval supplies passed steadily up Yonge Street, bringing Government gold to the farmers near the road. Millers are said to have worked night and day grinding imported grain. There can be little doubt that the war hastened the development of the area and before long a steady increase in population enabled this development to continue.

(b) 1825-1867

Most of this area was no longer on the frontier of settlement by 1817. There was unsurveyed land north of Uxbridge Township, but beyond Markham Township settlement already stretched a long way towards Lake Simcoe. Ten years later settlers were beginning to move into townships around this lake; the frontier period was over south of the ridges. The change was gradual in the twenties. There was still a great deal of uncleared land and new settlers might easily feel that they were in a primitive wilderness. Unless they had visited a newly-opened township, they did not realize how much benefit they derived from the presence of established neighbours and all the conveniences of roads (of a kind), mills, stores and, before long, villages.

The improvement in the older clearances was becoming very marked in the later 1820's, and after 1830 it was still more noticeable. This backwoods phase was one of sharp contrasts. On one part of a concession new settlers might be living in rough cabins set in tiny clearings, while a little farther on would come a stretch of well-cleared farms, whose owners had progressed to dressed-log or frame houses. In places the cleared land was spreading back from

the roads and joining to form large areas instead of groups of isolated clearances. Picket fences were replacing rails around some dooryards, gardens and even orchards. The front fields were often free of stumps, though there were plenty in sight farther back. The road allowances had been cleared and main roads were losing the look of trails through the forest. At the crossroads were groups of houses, some already becoming villages, with taverns, stores and blacksmith shops. These were soon dominated by the taller frame inns and store buildings, with their characteristic two-storeyed verandas. Such buildings were very common in the 1830's and lingered somewhat longer in this area than in some other sections. By 1850 they were considered a little oldfashioned.*

Here and there a miller, merchant or well-to-do farmer† was building a brick or stone house. The full number of these is concealed in the returns,** but some certainly were built in the late twenties, though they must have been few before 1840. The proportion of better houses in Markham advanced from less than a third in 1825, to nearly half the total in 1840, although the number of round log houses was steadily growing in that period. The advance in the other townships was rather slower in proportion to the total, but the increase in the number in these categories nearly as rapid. In the Census of 1851 squared-log houses are no longer distinguished from those of undressed logs. At that time there were 475 log houses in Pickering Township, 423 frame houses, 40 of stone and 19 of brick.

* In 1851 it was remarked that these porches gave Newmarket an oldfashioned look. In the 1860's wooden "awnings" over the sidewalk, on posts or brackets, became the fashion. About thirty years later, such awnings were thought to make Hamilton look oldfashioned!

† The three occupations are often combined as was the case with the Milnes. Businessmen often ran farms before 1870.

** Because the highest class includes all houses of two storeys not of dressed-logs and the class for brick or stone, 1 storey, included frame after 1827.

Hastings House, Lot 24, Con. V, Pickering Township—Nathaniel Hastings took up this lot in 1828. The Hastings family has lived here ever since—this stone house with brick trim was probably built not more than twenty years later.



Robb House—Lot 2, Con. VIII, Markham Township—dated over door 1853 — Compare the masonry, greater use of brick and larger windows with the Hastings House. The modern dormers have been well designed.

William Major House—Lot 26, Con. V, Pickering. William Major occupied this lot before 1860. The recessed doorway is typical of the 1850's but the Gothic window is a type popular in Markham and Pickering but rare elsewhere.



Building a good house in the 1830's took time. Peter Milne, Senior, at Markham Mills seems to have begun operations in 1834. In October he paid William Pearson of Scarborough Township \$61.25 for making 61,000 bricks, probably on the site. In December Joseph Tomlinson is paid \$116.23 for lumber from his sawmill* and the following March John Wilson received \$18.00 for 45 barrels of lime. The stone for the foundation was possibly brought from the river bed. In July George Wilson, a bricklayer of Markham, receives a large payment and by November his account has totalled \$107.21. On the same day William Burns receives a "first payment for work at his House from Peter Milne". A much larger payment is made to Burns on December 26, 1835 and on August 1, 1836 his final account is paid, making \$443.75 in all. This probably covers both the rough carpentry and the finishing "joiner's work", but mason's work, plastering lath, shingles, fittings, excavation and cartage remain unaccounted for. The house probably cost about \$1500 but not much more.†

The Milne house is still standing and contains nine rooms, a basement kitchen, two parlours, two chambers and two smaller rooms on each floor with ample central hallways.** Some larger two-storeyed houses had been built earlier, such as Peter Reesor's massive stone house near Cedar Grove (1830-32) and the even larger frame built beside Byer's sawmill near Milneville in 1829. These, however, were farmhouses of the roomy Pennsylvania type, with some Mennonite

* Probably at Sparta (Box Grove).

† The blank book in which Peter Milne wrote these and other receipts is in the possession of Mr. John Lunau of Markham, who most kindly lent it for the preparation of this section. By no means all payments made were included in this book.

** A small wing has been destroyed. This may have been part of the house as built but was not essential. At this time sitting-rooms were often called "parlours" even if used for eating in. "Dining room" and "Drawing room" were rather fancy terms. Contemporary plans often show a "Drawing room" and "parlour" but no dining room in modest houses.

peculiarities.* Such houses were the exception in Markham and not the rule as they were in Waterloo Township. The Milne house was more typical of the aspirations of the ordinary settler and most of those built in the 1830's and 1840's are versions of this type. The smaller houses followed the larger as nearly as means allowed. Most builders preferred the "less than two-storey" class and the storey-and-a-half farmhouse had become the usual type by 1850, as it was to remain for nearly a century.

Inside the houses the changes were also marked. Windows were larger, rooms were plastered and papered, floors boarded. There were more separate rooms and less need for "doubling-up". The crude furniture was disappearing from the main rooms and by 1845 walnut was replacing the earlier maple and cherry. Imported woods were becoming more common. Cabinet-makers were to be found in most villages by 1850, while in Toronto their workshops had developed into factories. By 1860 these factories were producing excellent furniture by a partly mechanized process and were cutting into the trade of the local cabinet-maker. The latter continued to produce well-made furniture, but many of the walnut and mahogany "antiques" of today came from Toronto factories of the 1860's. Honest workmanship and good materials were still the rule in factory or workshop. The taste of the time can be criticized, but shoddiness was not yet hidden by showy elaboration.

The "Dutch" settlers continued to prefer stoves. Many of the large houses had only the two hearths allowed to this class after 1827.† They could hardly have been kept to a livable temperature with only two open fires. Other settlers

* Besides a general "plainness", these include two or more "front" doors and a large room near the centre of the house. This probably held the main heating stove.

† This is implied in the classification in 1827 and definitely stated for some years after 1829. It may partly account for the increase in large houses in the 1830's.

adopted the stoves more slowly. With ample supplies of fuel, they grudged the extra chopping needed for stovewood and valued the firelight when good candles were dear and coal-oil lamps unknown until the late 1850's. The usual light was from home-dipped tallow candles and in ordinary households it was an extravagance to have more than one or two lighted at a time. They were eked out by primitive types of lamp that gave a flaring light from some kind of fat. David Gibson, in 1827 notes that "every farmer has an oven built of brick.... they make as good bread as any Scotch Baker".* Before long the cookstove was coming into use, but did not altogether replace the fireplace for cooking until the end of the period, when it had long been ousted from the bedrooms and even the parlours. The box stove or franklin took its place in the body of the house by 1850, though some people liked an open fire in one sitting-room. Fireplaces lingered in the summer kitchens or basement stillrooms even after they had been given up everywhere else. By 1850 furnaces were being advertised in Toronto papers, but were still a luxury in 1867. This was also the case with inside plumbing of all kinds. It was available by 1851, but was found in few country houses and not many city ones in 1867.

In 1827 stores and taverns were multiplying in the watershed. Money was still scarce and farmers were still glad to "get a little whiskey, Tea or Cloth"† in exchange when they took their ashes to the "potash". This scarcity of cash did not improve much until the 1840's. Business was carried on by barter, but it was no longer necessary to make and mend everything at home. Gibson emphasizes the independence and self-sufficiency of the Canadian farmer, but he was

* David Gibson, D.P.S., to a friend in Scotland, 1827. Ont. Hist. Soc. Papers and Records, Vol. XXIV. Gibson was writing from his cousin's house, Alexander Milne's, in York Twp., but had got much of his information while staying with Peter Milne at Markham Mills.

† Ibid.

thinking chiefly of the Markham farmer who followed a "plain" way of life by choice and religious conviction. Even if the farmer still dressed in homespun, much of the labour of cloth-making had been taken off the hands of the housewife. The wool was still spun at home, but it could be carded and fulled at the mill and travelling weavers were more numerous. They charged a high price - 12 to 15 cents a yard for plain cloth - and wove 8 to 10 yards a day, demanding their board and lodging as well. Tanneries were also within reach and shoe-makers were to be found at some of the crossroads.

"Hudden Gray (undyed homespun) is a very common dress of the farmers in U.C. particularly the Dutch, there are a great many Dutch farmers that have excellent farms in the Township of MarkhamThey are an industrious set of people and attend to the improvement of their farms very much, indeed more so than any other set I have met in Canada."*

Farm methods had changed very little since the first days of settlement; they were not much altered before 1850. If possible new land was cleared each year for wheat. Other crops were grown without system on the land from which the stumps had been cleared. Gibson describes the method of clearing new land, of getting out stumps and of sowing the wheat. He goes on

"I don't think they have any regular rotation of cropping here, it is very common to sow Timothy grass with the first crop of wheat and let it lie in the grass as long as it will cut for hay. They seldom drive out their dung from the barn although the land would be much better of it, they consider it to be more expense than profit to carry it far from the barn so lay it on some place near that they think stands in need of it. They generally keep sheep so as to have wool for their own clothes".

Gibson might have added that the farmers in Markham were already keeping more than the average number of cows and other cattle. This had been true before 1812, as may be deduced from the references to barns in the settlement certificates. Though small by later standards, some of these

* David Gibson in the same letter, 1827.

were evidently bank barns of the Pennsylvania type. The size of Peter Reesor's barn*, built in 1831, shows that some farmers were keeping stock almost on the modern scale. When Gibson wrote, the average number of milch cows per family for the Home District was rather above the Provincial average; it was about three cows to two families. In Markham there were about 9 cows to four families; the average in Pickering was slightly over two cows per family; in Scarborough it was less than two cows to three families. The Markham farmers raised fewer calves than was the rule in the other townships, indicating a tendency to prefer dairying to the sale of "neat" cattle. They kept about the same proportion of draught oxen, but had more horses. There were four stud horses in Markham and only one in each of the other townships.

It was at no time safe to make general statements about the condition of farming in this part of York County, for local conditions produced a wide variation of methods. In any period some farmers were to be found who were in advance of the standards usual in the Province. Many of these had other sources of income, but were still keenly interested in their farms and in a position to "plough back" more of the profits than was possible for the average settler. In the 1820's and 30's many keen and experienced farmers were coming into the area. Some came by way of the United States, bringing with them the capital and experience acquired during their stay. Others came direct from England or Scotland with the latest ideas of modern farming. These various types of up-to-date farmers were active in importing stud animals to improve the local breeds, in experimenting with new crops and new systems of cropping, in manuring, liming and draining their land. They gradually influenced their more conservative

* Near Cedar Grove. The date is cut in the south gable. This is a fairly large frame barn of Pennsylvania type with the stable in the foundation and a deep over-hang on the east side.

neighbours, and even when Gibson wrote, a change was beginning in the farming of the area. Progress continued through the next twenty years and by 1846 the system was well established which was to continue through thirty years of agricultural prosperity.

The most prominent feature of the new system was the growing of heavy grain for sale - usually for export. Wheat was already being exported from Toronto in considerable quantities in 1845. The quantity of wheat shipped was less than that shipped from Port Hope and some other ports, but 153,226 barrels of flour were exported in 1845. The system made considerable use of summer fallow, with crops of peas used as an alternative before planting wheat or included in the routine with oats or other grain. The land was retired at intervals into hay or pasture, but roots and most fodder crops were still grown on separate fields and there was no regular rotation. Peas were already available for export in 1846, but the quantity was much greater in 1850, showing that the system was in wider use. In the 1860's barley was in demand for brewing, both at home and in the United States, and the distillers used considerable quantities of rye. These grains were often grown in preference to wheat, but rather less in this area than in neighbouring districts.

The average numbers of milch cows declined by 1830. This was partly because of the increased emphasis on wheat, and partly because of the influx of new settlers, who had little stock and were inclined to follow the fashion of wheat-growing. Wheat had always been the most certain cash crop. It was, in the early 1830's, considered to be profitable to clear land and plant wheat by contract or with hired labour. Some people thought this a delusion, and the depressions of 1833 and 1837 had a restraining effect. Wheat growing increased again in the 1840's and reached its peak after 1854. A Reciprocity Treaty was signed in that year

with the United States and war broke out with Russia, barring Russian wheat from the British market. The export trade that had grown under favourable tariffs in the mid-forties, now boomed heavily only to drop abruptly in 1857. It soon recovered and continued, with fluctuations, for another ten or twelve years; but by then local demand and the uncertainty of the grain trade had already turned farmers in this area to a more varied type of agriculture.

It is obvious that the farmers were keeping more stock and growing a wider variety of crops to meet the demands of the city market. Potatoes, oats and corn were being grown in larger quantities. Fenced pasture was in much higher proportion to cropland in Markham than in Pickering and Scarborough in 1850. The southern townships were still growing more wheat and rather less oats, though the crop of 1850 was high in Scarborough in proportion to the smaller area of cultivated land. However, it would appear that the change to mixed farming had gone much farther in Pickering than in Markham. The Pickering farmers were producing more hay, potatoes, cheese and butter; they produced more wool from only a few more sheep and kept more "neat" cattle. If there is no misprint in the figure for 1850, they grew far more turnips than was usual in Canada West. In proportion to acreage, Scarborough was also ahead of Markham in most of these items and of both townships in production of cheese and potatoes.

"Regular rotations" were probably still in the future; peas were grown in about the usual proportion to wheat. However, such a variety of crops can hardly have been produced without a more intelligent use of manure, lime and gypsum.* The conditions in Pickering reflect the influence of the old-country settlers, whose methods were as advanced for 1850 as the Pennsylvanians had been fifty years before. It

* The only chemical dressings used at this time.

also indicates the importance of water communication, for the city market was now important and most farmers in Pickering were farther by land from Toronto than most in Markham. Much of the produce of Pickering Township must have gone by water from Frenchman Bay and the mouths of the rivers, both to Toronto and for export; but as these were not ports of entry no figures are available. The "Pickering Harbour Company" had only begun its improvements at Frenchman Bay in 1851. They cannot have been finished long before the railway was completed in 1856. This port did a thriving trade in the sixties when lumber and produce were being exported to the United States.

The practice of teaming produce to points on Yonge Street or the Kingston Road, where buyers waited to make their bargains and load their waggons for the rest of the trip to market, had probably begun before 1855. It lasted through much of the century, for even the later railways still left some farmers at a distance from a station. On the Kingston Road the meeting place was the "Halfway House" at the end of the Kennedy Road in Scarborough. Buyers are said to have gone up Yonge Street to Hogg's Hollow or Lansing. In either case the farmer (who had started long before daylight) could, if he did not sell his load, continue to the market itself. Those from the east used the Don and Danforth Plank Road (Danforth Ave. and Winchester Street) so that both lines converged on Jarvis Street above Carlton. Even after 1900 households in the big houses on Jarvis Street wakened on Saturdays to the tramp of loaded hay waggons and the procession lasted well into the morning.

The figures for 1850 show that most of the area had already passed beyond the backwoods economy, though this must have continued in parts of Uxbridge Township for some years longer. In many other ways this change was taking place in the thirties, forties and fifties. Horses were

replacing oxen on the farms and roads. In the 1840's a wide range of ploughs and cultivating implements was available and the threshing and cleaning of grain was already mostly done by horsepower machines, soon replaced by steam tractors. Nevertheless, a great deal of farm work was still done by hand in the old way and many of the ingenious hand-made tools found in museums are less than a century old. Grain was cut with the scythe and cradle in the sixties, in the same manner that David Gibson had thought such an ingenious improvement in 1827. Reapers and mowers (usually combined as one machine) were available in the fifties, but in spite of some early experiments no satisfactory binder was evolved until much later.

Travel had become much easier after 1840; the plank roads were good at all seasons and macadam or gravel roads usually good except at the break-up. The second map shows the macadam and plank roads in 1860-61, but it must be remembered that the use of gravel had already improved many other stretches of main roads. The stages on the Kingston Road, which had begun as "stage waggons" in 1816 and been replaced by 1830 by Weller's coaches, passed out of use when the Grand Trunk was completed. The Yonge Street "omnibuses" continued to run to Richmond Hill and the connecting lines on the other roads gained in importance. In 1857 there were a number of these crossing the watershed. It was possible to travel by stage from Uxbridge Village, by Goodwood, Stouffville, and Markham, to Scarborough or to reach Yonge Street by way of several lines across Markham Township. In Pickering stage lines ran up the Brock Road and across the Sixth and Ninth Concessions, connecting with lines in Markham. Other places had connecting lines and these had much to do with the growing number of post offices, though mail was sometimes carried in gigs or buggies as it had been earlier on horseback. Far more "pleasure waggons", gigs and carriages are returned in 1850 than in 1840 and in the sixties most farmers had some kind of carriage, as well as a cutter for winter.

A number of "common schools" were opened soon after the passing of the School Act in 1816, so many that they cannot be listed here or any attempt made to determine priority. This Act gave little financial assistance, but authorised the election of trustees, who engaged teachers and enforced the payment of fees. The School Act of 1841 went farther, allowing some taxation and contributions to teachers' salaries by the District School Boards. A great number of new schools were opened under this Act. Fees were still charged until 1846, when a new act set up the present public school system. Still more schools were opened under this Act, and by 1867 practically every modern school section had its schoolhouse. A few of these schoolhouses are still in use.

It was in the first common schools in Scarborough Township that John Muir, father of Alexander Muir, first taught in the 1830's after his arrival from Scotland. Because he moved frequently from school to school, before acquiring a permanent home near Woburn, the birthplace of the writer of "The Maple Leaf Forever" is uncertain. It was probably in the vicinity of Lamoreaux or Ellesmere. Alexander Muir himself taught in several schools in Scarborough Township both before and after 1850.

There were no churches or meeting-houses in this area in the middle of 1817,* though a number of congregations had been organised and were meeting in private houses. It seems probable that a Mennonite Meeting-house was built at Milnesville before the end of 1817. In 1819 Lutheran churches were built at Unionville and Buttonville. All three are shown on Goessmann's plan of Markham in 1824. In 1819 also the first church of St. Andrew was built at Bendale in Scarborough Township. In 1814 Timothy Rogers deeded seven acres of

* This is definitely stated by Miles, Fenwick and Mustard in the reports of 1817 mentioned above in Chapter 3 and again referred to under "Mills".



St. Andrew's Church—Bendale—Scarborough Township—built in 1849 by Presbyterians to replace one of 1819. St. Andrew's was the heart of the settlement begun by David Thompson in 1796. An old Indian trail led past a village occupied about 700 years ago. To the left stands the old "Mechanics Institute Library", still in use.

Erskine Church — Lot 26, Con. II, Pickering Township — 1854. Built to serve Presbyterians who did not wish to go so far as Dunbarton every Sunday. The church stands in a beautifully kept yard and has its old fittings, but the overgrown spruce trees hide its good proportions.



Melville Church—Lot 29, Con. I, Markham Township—founded 1845 by a group seceding from the older kirk at Cashel.

Lot 13, Con. I in Pickering to "Nicholas Brown and others" and in 1820 he bought back five acres of this parcel. It seems likely that a meeting-house was built between these dates,* near the site of the existing brick building. St. Andrew's Church was rebuilt in brick exactly thirty years after the building of the first church. The others were rebuilt more than once after 1850 and the Lutheran Church at Buttonville was finally torn down. It is possible that a Presbyterian church was built at Crosby's Corner (Cashel) about 1827, for the old cemetery there was given for the purpose in that year. However, in 1837 large subscriptions were being collected from members of the congregation, including Peter Milne, Senior,† so it is possible the church was built or rebuilt in that year. This church has also been destroyed.

No other churches seem to have been built in this area before 1830. In 1851 there were seven church buildings in Pickering Township, twenty-seven in Markham Township and eight in Scarborough Township. Most of these were in the watersheds discussed in this report. It is hardly possible to give the history of all these churches, some still standing and in use, or to discuss some and omit others. The earlier ones have been mentioned as having some general interest and illustrating the development of the area.

* One is returned in the Census of 1851-52.

† Peter Milne gave a little over £20 Currency (\$100).



ROUGE, DUFFIN, HIGHLAND AND PETTICOAT WATERSHEDS ABOUT 1861

BASED ON TREMAINE'S MAPS OF YORK AND ONTARIO COUNTIES

LEGEND

- ROADS**
Rough lines: Roads shown as planted, macadamised or gravelled
Solid lines: Other roads
Dashed lines: Concession Lines — unopened or partly used
Thin solid lines: County Lines
Thick solid lines: Township Lines
Double lines: Railways

WATER MILLS

- Grist, Flour or Oatmeal
- Saw
- Woollen Mills or Factories

STEAM SAWMILLS

- Steam Sawmills



CHAPTER 5
MILLS AND VILLAGES

1. Mills

(a) Early Mills 1817-1825

It seems very probable that the first mills in any of these watersheds were built on Highland Creek by William Cornwell in 1804 or 1805. The first mills in Markham Township were of course on German Mills Creek, a branch of the Don. A saw and grist mill was planned in Pickering Township in 1797. There are three letters in the Survey Records of the Department of Lands and Forests dealing with this plan of David William Smith's and a copy of the order to the Hon. John McGill, Commissary-General, to issue Smith the necessary equipment from the government stores. Although there is no evidence that these mills were even begun, this order is interesting as showing what was needed for early mills of this kind.

" For the purpose of erecting Mills in Pickering please to issue to D. W. Smith Esquire -

One pair of Mill Stones with the necessary Iron work for a Grist Mill, and the necessary Irons for a Sawmill to carry two Saws; a Boulting Cloth with appendages; and the usual proportion of Seives - Shingle nails for Roofing, and in case of deficiency of Iron Work, iron to be issued in lieu there of - taking his receipts for the same -".

Smith still had these articles at the end of 1799. It is not known what he had done with them or what became of them after he went to England in 1804. It is possible that his agents turned them over to Timothy Rogers in 1807 and that they were used for the first mills in Pickering Township. Smith had said he was building the mills at the request of the inhabitants of Whitby, Darlington and Clarke Townships. The inhabitants of Darlington Township were not using these mills in 1801. In 1804 there were settlers in Scarborough and Pickering and there is nothing unlikely in William Cornwell building mills on Highland Creek at that time. The mills stood just below the old bridge on

Bruce Mill—Caspar Shirk built the first grist mill here in 1829—it was rebuilt in 1858. The overshot water-wheel is in place to left and the frame of 1829 in storehouse to right. Owned by Bruces since 1843. Now a chop mill—on the Rouge River.



Whitevale Flour Mills — formerly White's Woollen Factory. The old flour mill stood farther north until burnt in 1874. Later a fire gutted this factory and it was converted into a flour mill—possibly the last in these watersheds—on Duffin Creek.



Ruins of Woollen Factory at Almira. An early wool-dressing mill was probably moved here from farther east between 1825 and 1835—in the 1840's it became Bowman's Woollen Factory — the ruins have been converted into a sawmill—on the Rouge River.



the Kingston Road. The lot on which they stood had been patented by an absentee in 1799 and so was available for sale, but the pond must have extended onto the adjoining Clergy Reserve to the west (Lot 8, Con.I) and William Cornwell leased this lot in 1810 or 1811. The mills were probably a saw and grist mill such as was usual at that time.

It does not seem likely that there was a second mill in Markham in 1805. Quetton St. George advertised in that year that he would buy wheat at "Milliken's Mill in Markham", but the indications are that Norman Milliken had leased the German Mills. Peter Reesor's saw and grist mill on Lot 3, Con.IX was probably the next mill built in Markham. It may have been finished as early as 1805, for the settlers near Cedar Grove would be in urgent need of mills. Martin Holter's grist mill on Lot 26, Con.VII may have been built at about the same time. There is reason to think that Isaiah Wilmot's saw and grist mill was later and, while the mills on Lot 9, Con.VII may have been built by Nicholas Miller between 1806 and 1810, it seems probable they were not built till 1814, when the property passed to James Osborne and Thomas Forfar. Timothy Rogers bought the site of his mills from D. W. Smith in 1807, but probably did not finish them until 1808-09.

In Scarborough Township Archibald Thomson is said to have built a sawmill on Lot 27, Con.II in 1808 and his brother, David, one on Lot 25, Con.I about 1811. One or two other sawmills in Markham may have been built before 1812; the other two were probably built during the war. It can be said with certainty that there were six grist mills on these rivers in 1817 and probably 11 sawmills.

Fairly exact information about the mills in Markham Township in 1817 is contained in reports made to William Chewett, Senior Surveyor and Clerk in the Surveyor-General's Office. In this case Chewett was using his authority as Colonel of the First York Regiment of Militia

to get from his junior officers information on mills, roads and churches that was needed in his office. Lieutenant James Miles, who commanded a company covering the southern part of Vaughan and of the first four concessions of Markham, also reports for Lieutenant Schutze whose area lay north of his own. He gives full information and illustrates his report with a plan. Captain James Fenwick's area covered Concessions V, VI and VII. His report is less full, but he locates the mills by lot as well as concession. Captain George Mustard gives only the mills in each concession for the remaining part of the township. More information is given by a report made in December, 1824 by John Goessmann D.P.S. in response to a circular letter from the Surveyor-General. Goessmann's report is full, if sometimes incorrect in details. He made a map of most of York County which has survived, but unfortunately he left Scarborough and Whitchurch blank and omitted Pickering and Uxbridge from both map and report.

The information from these reports is tabulated on the next page. Some explanation is needed of the names of owners given by Goessmann. He was a Hanoverian and possibly a little deaf. He always wrote distinctly German English and usually misspelled names in his letters. "Dr. Baldwin" is William Warren Baldwin, an absentee. He had inherited this property from his father-in-law, William Willcocks, who bought it from Francis Schmidt in 1804. Miles gives Captain John Large as the occupant in 1817 and he was living there in 1837. "Mr. Tumbleson" is Mr. Tomlinson. A "Joseph Tumbleson" signed the 1811 petition with his mark, but the owner of this mill east of Brown's Corners was Emanuel Tomlinson in 1861. Peter Milne had bought the mills on Lot 9, Con.VII a few months before Goessmann made his report, and "Mr. Millerby" probably refers to him. Martin Holter appears as "Hotter" in

MARKHAM AND WHITCHURCH TOWNSHIPS

MILLS ON ROUGE RIVER AND DUFFIN CREEK - 1817 AND 1824

<u>Lot</u>	<u>Con.</u>	<u>Type, 1817</u>	<u>Owner, 1817</u>	<u>Type, 1824</u>	<u>Owner, 1824</u>
14	3	S.	"Capt. Large" (Occupant)	Saw	"Dr. Baldwin" (John Large - occupant in 1836)
18	3	S. & G.	"Isaiah Wilmot"	S. & G.	"Mr. Wilmot"
25	2	-	-	S.	"Mr. Eyer"
11	4	-	-	S.	"Mr. Tumbleson" (Tomlinson)
30	6	-	-	C.	"Mr. Hubert" (Jasper Hubbard)
9	7	S. & G.	-	S. & G. C. & F.	"Mr. Millerby" (Actually Peter Milne, Sr.)
26	7	G.	-	G.	"Mr. Hotteman" (? Martin Holter)
30	7	S.	-	-	-
5/6	8	S.	-	S.	"Mr. Peter Roemer"
22	8	-	-	S.	"Mr. Daniel Bayer" (Byer)
24	9	S. & G.	-	S. & G.	"Mr. Peter Reesor"
15	10	S.F. & C.	-	S.F. & C.	"Mr. Christian Reesor"

DUFFIN CREEK

35	9	-	-	G.	"Mr. Stauffer"
1 (Whitchurch)	9	-	-	S.	" "

S.	-	Sawmill
S. & G.	-	Saw & Grist Mill
C.	-	Wool Carding Machine
F.	-	Cloth Fulling Machine

1817

7 Sawmills on Rouge River
4 Grist Mills on Rouge River

1824

8 Sawmills on Rouge River
1 " on Duffin Creek
4 Grist Mills on Rouge River
1 " " on Duffin Creek...
3 Carding Machines on Rouge River
2 Fulling Machines on " "

some documents. It would be easy for Goessmann to turn this into "Hotteman". "Mr. Hubert" is probably Jasper Hubbard. The other names are fairly correct, though Raemer and Stouffer are given German spellings.

Goessmann gives the number of "run of stones" for each grist mill. Peter Reesor's was larger than the average with three run of stones; Holter's and Wilmot's had only one run; Miles' and Stouffer's two. From the assessment returns for 1825 we learn that Rogers's mill on Duffin Creek had an extra pair of stones, but that the mill on Highland Creek had only one. The returns show that no new mills were built in Markham Township between December 1824 and September 1825 and probably none in Scarborough. Three sawmills were returned in Pickering Township. One of these was below the old Rouge bridge, but the other is hard to locate. It has been included among those on Duffin Creek, but may have been on the McGowan millsite near Audley and so not in this area.

(b) 1825-1861

The second table gives a selection of the figures from the returns of 1825-50. They must be regarded as probable approximations, for allowance must be made for possible errors in the returns and it is difficult to decide how many mills were outside the area. This is not very hard in Markham, for there is fairly full information about the mills on the Don. In Scarborough there were two sawmills built on Taylor Creek about 1816. One of these was probably given up in the 1820's and the other by 1830, but the dates are uncertain. There were so few mills in Uxbridge Township before 1840, that the figures given are probably correct. It is more difficult to be sure about the mills in Whitchurch.

There are more fluctuations in the returns than the table indicates. Some cannot be explained but in the case of the grist mills they sometimes agree very well with what is known from other sources. The fluctuations in Markham are largely due to the changing fortunes of the German

Mills until they finally disappear in 1838. But when another mill is dropped in 1828, it can be assumed that it is the old Holter mill. New mills on the Don account for the additions up to 1840; the new mills built in 1840-41 and 1843-44 were on the Rouge. Four grist mills had survived from 1825 to 1851; there were two new grist mills at Markham Village, making eight with the Bruce mill. The first grist mill at Unionville probably dates from 1840-41. One of the others was probably at Buttonville. There are several possible locations for the eleventh.

In Pickering the Rogers mill seems to have closed in 1827. In 1829 a smaller grist mill is returned, possibly the one built by Joshua Wixon in the Ninth Concession east of Claremont. For two years this was the only grist mill in the township. A grist mill built or rebuilt in 1830, proved short-lived. It was gone by 1833, but the saw and grist mill built in 1831-32 on Lot 15, Con. V by a Mr. Sicely lasted about ten years. In 1833 this was the only grist mill returned in Pickering. It was sold to Henry Howell and formed the nucleus of the village of Howell's Hollow. The mill built by Charles Fothergill on Rogers' millseat in 1834, was gone by 1841. James Elliott built his mills above Kingston Road at Pickering in 1837. They were sold to Peter Head, the innkeeper, by 1846. The first grist mill at Greenwood was built in 1840 by an Englishman named Cockerline who sold it to Frederick Green in 1843. Soon after, Henry Howell built a new grist mill immediately above Green's and at about this time John Michell built a grist mill on the east side of Lot 18, Con. VIII south of Claremont. Head's, Howell's, Green's and Michell's mills would account for the four grist mills returned in 1844.

The second grist mill in Scarborough was probably the Secor mill on Lot 19, Con. D between Scarborough Village and Woburn. If so it was built in 1826, earlier than has

been supposed. This mill was burned in 1833 and rebuilt in 1834. The mills at Highland Creek were evidently given up at this time and the John P. Wheeler grist mill half a mile west of Secor's was the only one in 1833. Secor's grist mill appears to have stopped running in 1838 and until after 1845 Wheeler's was the only grist mill in Scarborough Township. Francis Squair, a millwright, who later owned a mill near Orono, worked for "Mr. Webster at the Rouge River" from May to July, 1844. He was building a grist mill, probably on Lot 1, Con. II north-east of Rouge Hill. This mill was not finished until late in 1845. An inspection of Clergy Reserves in Scarborough Township in 1845 shows that there were no grist mills on the Rouge or Little Rouge in Scarborough at that time. The distances "to a mill" all point to Cedar Grove or Bendale. There may, however, have been some sawmills.

The number of sawmills was growing more steadily during the 1830's and forties and the fluctuations are less apparent. Most of the grist mills had sawmills attached to them, but this would account for only a few. A number of settlers who arrived in Pickering Township in 1832-37 are recorded to have built sawmills soon after their arrival. This is borne out by the assessment returns. More were built in the 1840's and the number given for 1848 is the highest recorded in this period, but the peak in Pickering and Scarborough Townships came later. The slight decline in 1850 reflects the depression of 1849, when the tariffs giving Canada a favoured position in the British market had been repealed. While the railways were being built in 1851-57 the demand for lumber was stimulated and there was again a demand for plank for new roads.

The number of sawmills returned for Markham Township in 1850 agrees pretty closely with those shown on Tremaine's map of York County in 1861. There must have been a few more water mills for not all the steam mills are likely to have been running in 1850. The map shows most of the

available mill sites still in use. Some mills are recorded in Scarborough Township that do not appear on the map. They were probably built between 1845 and 1855. They may not have been running in 1860, but one or two were certainly running later. It seems likely that there were 90-95 sawmills in the area about 1857, including steam mills.

Already in the 1830's grist and flour millers seem to have been giving up the lumber business, though some kept their sawmills going for custom work. Peter Milne, Senior, when he required any quantity of lumber, bought it from Joseph Tomlinson, though there was still a sawmill at Markham Mills. In the fifties a number of millers cease to be listed as "saw mill owners". In some cases they had rented their sawmills. A good many of the sawmills returned in 1850 were run as sidelines by farmers and millers. Most of them operated only in the spring and late autumn. Steam sawmills began to appear in this area in the late 1840's. Tremaine's maps show eleven in this area in 1860-61. There may have been one or two others, and there were several just outside the area.

In preparing the second map in this chapter Tremaine's maps have perhaps been followed too strictly. On the map of York County Tremaine sometimes shows a mill pond with buildings near it but omits any symbol to indicate that the mill was in operation. He sometimes shows one symbol where there should have been two. Besides the symbols are often very faint and it is often hard to distinguish "S.M." from "G.M." or even from "S.H." signifying school house. In Markham the chief omissions seem to be in the grist mills. Crosby's flour mill at Unionville was certainly running in 1861 and probably Brown's mill at Buttonville. There was one, and possibly two, grist mills at Markham Village besides the two shown. In Scarborough Township W. D. Thomson's grist mill on the Little Rouge on Lot 2, Con. III was built about 1850. It may not have been running in 1861 for some

WATER MILLS, ROUGE, DUFFIN, HIGHLAND AND PETTICOAT CREEKS

AS RETURNED FOR ASSESSMENT, 1825 - 1850

	1825		1828		1832		1836	
	G. M.	S. M.	G. M.	S. M.	G. M.	S. M.	G. M.	S. M.
Markham	5	8	4	8	5	14	5	14
Pickering	1	3	-	5	3	7	2	11
Scarborough	1	3	2	4	2	5	2	7
Uxbridge	-	-	-	-	-	-	-	-
Whitchurch	-	2	-	2	-	4	1	5
Totals	7	16	6	19	10	30	10	37
	1840		1844		1848		1850	
	G. M.	S. M.	G. M.	S. M.	G. M.	S. M.	G. M.	S. M.
Markham	5	15	9	20	10	25	11	22
Pickering	3	11	4	20	6	26	5	22
Scarborough	1	12	1	16	2	23	3	23
Uxbridge	-	1	-	2	-	2	-	4
Whitchurch	-	5	-	7	-	7	-	7
Totals	9	44	14	65	18	83	19	78

reason, but a few years later it was being operated by James Maxwell. A sawmill should possibly have been marked near the oatmeal mill (Aitkins) on Lot 3, Con. III. There were sawmills there both before and after 1861. The totals given below have been corrected to give the largest probable figure for 1861. The map of Ontario County in 1860 is badly worn and stained. A blot concealed the symbol for Tripp's sawmill, built about 1837, near the mouth of Petticoat Creek. This was only deciphered after the map was printed.

(c) 1861-1915

The number of sawmills began to decline fairly rapidly after 1860. The highly selective cutting of the early days was still in use. The sawyers rejected logs that would now be considered very large. The supply of such timber would be exhausted very quickly, especially as in the fifties a great deal was still going out as squared timber. The lumbering trade had moved farther back from the lake by 1878. The County Atlases of 1877-78 show far fewer sawmills than Tremaine in 1860-61. It is probable that some are omitted, but the directories show that a good many sawmills were given up, at least for a time, after 1870. About 1880 there was a revival of lumbering in this area, especially in the Ridges. Clear-cutting had become the rule; there was a demand for smaller second-growth timber and even for timbers from the old log barns. Much of this sawing was done in steam mills, many of them portable mills. Permanent steam sawmills were, however, built in several villages and a good many of the old water mills were still in use.

MILLS RECORDED 1861-1893

	1861	1878	1887	1893
Grist & Flour	28	30	27	18
Sawmills	89	37	34	21
	117	67	61	39

There were 11 steam sawmills in 1861; the number was smaller in 1878 because some of these mills had been moved outside the area. Some sawmills had been replaced by grist mills, others were converted into specialized wood-working mills. Many were given up altogether. The proportion of steam mills was higher after 1880. A few grist mills were converted to steam in the sixties; the Wheler mill at Stouffville was a steam mill in 1869. As a rule steam was only installed as an auxiliary source of power. The grist and flour millers usually kept up their ponds. Some grist mills had become chop mills by the nineties. In some cases a woollen mill was turned into a flour mill in the eighties. This happened to the large factory at Whitevale, at Lemonville and possibly at Almira. It is possible that some of these were not reported in 1893. The floods of the seventies, eighties and nineties were responsible for the abandonment of some mills. After 1878 it was often not worth while to rebuild the dam. This is even more true of more recent floods in the 1920's and 1930's,

Some of these mills had a long history. The Ratcliff sawmill was operated by the same family for more than a century. The Bruce mill has been operating on the same site since 1829 and for 110 years has been owned by the Bruce family. There has been a mill at Buttonville for more than a hundred years. As a rule there was less continuity of ownership and still less of operation. A good many owners employed hired millers or leased their mills. Richard Snowden worked for Peter Milne as miller in 1832-33. He was succeeded in 1834 by Frederick Green who was employed to 1838, and possibly until he moved to Pickering Township and gave his name to the village of Greenwood. Snowden was again miller at Markham Mills from 1840-44 and from 1849-1853. Peter Milne paid his millers \$18 a month, but Snowden was getting \$20 from Thomas A. Milne in the 1850's.

(d) Coopers' Shops, Stave and Shingle Mills

All these industries began as handcrafts, though sawmills began very early to turn out "junks" or "chunks" of the proper sizes for the different types of staves, and blocks to be split into lath and shingles. As flour, pork, whisky and a variety of other produce were shipped or stored in barrels, coopers' shops were the first industry to be started near the mills. There were five coopers in the village of Duffin's Creek in 1853. These shops were often attached to the grist mills and the coopers paid by the millers. There were about twenty such shops in the area in 1864. After 1870 the number declines rapidly and few large cooperages or barrel factories seem to have been set up in this area.

There was a stave mill at Balsam in 1864 and two near Claremont. These were probably water mills and did not last into the 1870's. The stave factory at Greenwood (Saltor's in 1864) lasted for about twenty years. These wood-working mills were now usually steam plants. They appear for short periods at different places. There was a large stave, heading and barrel factory at Whitevale in the 1860's (Spink Bros.). It was burnt before 1874 and not rebuilt. In the eighties there were stave mills at Woburn and Green River, but there do not appear to have been more than two or three in the area at one time.

Shingle mills do not appear until the late 1860's. There were at least six in the area in 1869. The two mills at Box Grove are not reported in the eighties, but Kelly's factory at Buttonville and Ramer's at Markham lasted until near the end of the century. After 1880 there were shingle mills near Armadale, Ringwood and Bethesda. Until the turn of the century there were usually three or four shingle mills in the area.

(e) Carriage and Waggon Factories

This was an important industry in most parts of Ontario from 1850 to 1890. There were already a large number of waggon shops in the 1850's and by 1857 a fair number of carriage factories. Some of these were already large establishments, like those in Markham, Stouffville, Unionville and Brougham. Almost every village, large or small, had a carriage or waggon factory or both. Carriage-makers often made waggons and waggonmakers sleighs. In the sixties there were more than twenty carriage shops in the area and between 25 and 30 waggon shops. The numbers did not alter much until the eighties, but after that they declined quickly. The railways had reduced the demand for waggons and the carriagemakers had to face competition from large factories outside the area. Besides they suffered from a difficulty that does not trouble the makers of motor cars. With better roads a good carriage would last a lifetime and more. Fashions changed very slowly and there was little need for frequent replacement, though some refurbishing was needed from time to time. By the turn of the century very few vehicles were being made in the area.

(f) Woollen Mills

The carding and fulling mills of 1817 have been mentioned. A few more were built before 1830. There was one at Howell's Hollow, and later one at Greenwood for a time. Rowland Burr built a carding and sawmill on the Rouge in the 1840's (Lot 3, Con. III Scarborough Township), but like some other mills of Burr's this did not last long. Martin Baderow's mill south of Malvern was built a little later and like some of the early mills became a woollen factory by the 1850's. Most of those shown on the second map were in existence in the fifties, some, such as the Milne factory at Markham, the Bowman mill at Almira and, probably, the Tomlinson mill at Box Grove, were weaving cloth in the 1840's. The large factory at Whitevale was built in 1867, but was burnt

out less than seven years later. The Kirkham mill at Highland Creek was built about 1880. There were still four or five woollen factories in the area in the 1890's, at Markham, Lemonville, Highland Creek, Altona and possibly Almira. None of these has survived to the present day.

2. Villages

About thirty-five village names can be counted on Tremaine's maps in this area, and two or three more are indicated without being named. A good many were already thriving in 1857. Some were old settlements, but very few were recognized as villages in 1851 and still fewer in 1846. It is impossible to say much about each of forty different places. Something will be said about the three incorporated villages and a few of the others will be mentioned briefly.

(a) Markham

Two houses are mentioned in a settlement certificate for Lot 11, Con. VIII in 1804, which suggests that one of these may have been a tavern. But who was keeping it if it existed in 1812 can only be conjectured. There must have been some cottages in the valley near the mills by 1817. In 1824 these mills were bought by Peter Milne, Senior, who turned over their management to his brother Alexander, devoting his own energies to running a store. With the building of Milne's store, probably on the Markham Road near the turn to the mills, the present village of Markham may be said to have begun. But it was about two years later that Joseph Reesor laid out the plot of "Reesorville" on Lot 11, Con. VIII. Here Sinclair Holden is said to have built the first house in 1826. Holden's house was also a store and others were probably opened in the next two or three years. In one of these, James Johnston's, a post office for Markham Township was set up in 1829. About 1830 William Armstrong built a large tavern and set up a distillery north of Milne's Mills. Within a few years he was selling

considerable quantities of whisky in Toronto.

In 1833 there was a schoolhouse in the village where church services were sometimes held. In 1836 Markham is spoken of as a large village with "two or three taverns, some stores, good private houses,". No estimate of population is given but Walton's Directory shows so many people living near the crossroads that the estimate of 300 in 1846 seems conservative. There were by then three churches and a circulating library. The new industries were a brewery, Robinson's tannery, the making of pumps, fanning mills and threshing machines, a foundry and the usual blacksmiths, waggonmakers and so forth. By 1851 the population had increased to 650 without much change in the occupations of the villagers. There were now a boys' and a girls' school, apparently private schools. In 1857 the list of trades is already very long. The "extensive manufactories" are mentioned "especially some for the construction of agricultural implements, carriages &c." Cloth-weaving, tanning and wood-working were equally important. Through the sixties the population of Markham was estimated at about 1,000. In spite of its early start as a thriving manufacturing village, there was not much growth in Markham until after 1880. The Census of 1881, the first after the village was incorporated in 1872, showed a population of 954. Incorporation had probably been applied for in the hope of a "boom" when the railway was finished. This hope was not realized in the 1870's, but in the eighties there was some advance and Markham contained 1,100 people in 1891.

During the nineteenth century the industries of the village remained much the same as in the 1860's. The number of individual firms grew rather less and in some the scale of production tended to increase. There was little chance for any village less than thirty miles from Toronto to grow into a town and Markham had to compete with large and thriving villages on each side - Richmond Hill, Newmarket

and Stouffville. After 1890 the influences that were causing a decline of village prosperity in Ontario, began to show their effects in Markham. The village population declined and by 1911 had fallen to 909. Some of the small industries had closed down in the face of growing competition from larger plants and others were becoming obsolete.

Possibly more important during this period was the village's position as a local centre. Markham was the administrative centre of a flourishing township. It had a secondary school from the 1850's, an active Agricultural Society and a newspaper of some local importance, the Markham "Economist". The first agricultural exhibition was held in 1855 and annual fairs have been held ever since. Among the acquisitions of the 1860's was a curling and skating rink. The village had always done a considerable "country trade" and from the early 1870's it has been a shipping point for produce.

Like many villages in the early days of motor-ing Markham seemed a quiet place just after the First World War. The village had been growing and the population was now slightly over 1,000. There was not much change in the next ten or twelve years. Commuting by car was only beginning, and Markham, without a good train service, was still rather far from Toronto. By 1940 Markham was feeling the influence of the expansion of the city population and this has become more marked in recent years. The Census of 1851 gives the village 1,606 inhabitants, but the limits have recently been enlarged, a great deal of building has been going on and the population reported by the municipality in 1956 is 2,706.

(b) Pickering

The most recently incorporated of the three villages is as old a settlement as either of the others. There was a tavern there before 1812 and probably a group of two or three houses near the bridge over Duffin Creek and

another by 1820 near the Quaker Meetinghouse, where a road led down to the first mills. Francis Leys had opened his store by 1824, a little farther east. He also kept some kind of an inn and it was here that a post office for Pickering Township was set up in 1829. However, the real start of the village followed the arrival of Charles Fothergill about 1834, and of James Elliott a little later. By then there was a school near the post office where Anglican missionaries (and possibly others) sometimes held services.

The mills Fothergill began to build seem to have been unsuccessful. His natural history museum was the most remarkable thing near Duffin's Creek in 1836. Elliott's grist mill, some distance north of the bridge on the east bank, was running by 1837. In that year there were 10-12 households at Duffin's Creek, most of them living north of the Kingston Road within a quarter of a mile from the bridge. In 1846 the population of "Duffin's Creek or Canton" is estimated as 130, a figure that may be low, judging by the number of householders listed in Brown's "Directory of Toronto and the Home District". There were now a tannery, a brewery, several stores and workshops, and four churches are listed: Presbyterian, Roman Catholic, British Wesleyan and Quaker. A fifth church, St. George's Anglican, was built in brick in 1848* and is still in use. The chief secular addition before 1851 seems to have been Payne's new hotel with its "careful hostlers". There was an increase all round in the number of craftsmen. There was a good-sized cooperage, and three new sawmills had been built in the vicinity; Post's, Palmer's and Haight's. Dr. Burns had been practising medicine at Duffin's Creek since before 1846.

The opening of the railway was not altogether an advantage. It gave Pickering importance as a station but ended most of the road traffic that had brought the village

* This church has been dated to 1841. A report of Arch-deacon (later Bishop) Bethune's in November, 1847 shows clearly that the church had not been begun at that date.

into being. The population had increased from 250 in 1851 to 300 in 1857, and this remained the usual estimate through the 1860's. There was some extension of carriagemaking at this time and two of the blacksmiths began to make agricultural implements. After 1865 Moses Smith built a second grist mill near the old Rogers site. As the Hoover mill this lasted to about 1890, when it was burnt and rebuilt on a larger scale. Elliott's mill had been sold to Peter Head before 1850. It was also burnt about 1874 and in 1875 Spink Brothers built a large brick flour mill a little south-west of the old, close to the Kingston Road on the north side.

These two flour mills were the chief industries in the village during the last part of the nineteenth century. The Spink mill was a large plant, important enough to have a spur line built from the Grand Trunk Railway. In 1905 a large grain elevator was built beside the mill and the buildings remained in use until they were torn down in the 1930's, though for some years before that they had been used chiefly for storage by the company owning the mills. The building of the Hoover-Brokenshire mill was burned in 1956.

The Friends' Seminary, a boys' boarding school founded near Picton in 1841, was moved to Pickering in 1877. and became Pickering College. The school was closed from 1885 to 1892 and was then reopened as a co-educational school. During the 1890's it was very well known.

The population of Pickering was estimated in the early seventies at 500 inhabitants. It is not likely that the village was ever larger than this, though, as Pickering was not incorporated until 1953, no figures are available. Just before and during the Second World War the population of the village began to grow larger for rather similar reasons to those affecting the growth of Markham Village. In this case Pickering was in a position to serve as a dormitory village for Oshawa as well as Toronto especially during the war. This growth continued after the war and in

1953 Pickering was incorporated as a village. The return of the following year showed a population of 944. The return of 1956 gives the village 1,056 inhabitants.

(c) Stouffville

Though there were settlers on the site in 1804, the village of "Stouffersville" did not come into existence until after the building of Abraham Stouffer's mills in 1817-24. The village was given this name from the first and as the name was pronounced "Stoffer" or "Stover", "Stoversville" was easily shortened into "Sto'ville". What was the official name of the post office opened in John Boyer's store in 1830 is uncertain. "Stoffersville" and "Stouffville" are both used in 1836, but ten years later the post office was called "Stouffville".

Stouffville seems to have grown rapidly. In 1835-37 it seems to have been a centre of the Reform Party in this section. At that time there was at least one tavern and more than one store. The first village seems to have been near the mills, east of the creek and on the Whitchurch side of the road. In 1846 there were thought to be about 70 inhabitants. Stouffville was then a road village with two taverns but not many workshops or any other industry besides the mills. A Congregational church was built in 1848. There was one doctor in the village in the 1840's and a second by 1851. The number of inhabitants was about 350; it had increased to about 500 by 1857. Steer's tannery and Spedding's foundry had been opened in the late 1840's. The number of stores and inns had doubled by 1847. Lumbering, cabinetmaking and waggonmaking were being carried on, but Edward Wheler's flour mill and Von Busach's harness factory seem to have been the most important enterprises in the fifties and early sixties.

Stouffville was much less a manufacturing village than Markham and much more a place of general business with "a good local trade". In the early days it had lacked

really good waterpower. This was less important after steam-engines became common, and Stouffville had its share of the small industry of the time. But the great advantage to the village was its position near the junction of roads from Uxbridge and Whitchurch to Markham. The village was steadily spreading eastward along this road. By 1851 Hiram Yakes had opened his inn where the Uxbridge road joined the Townline and a hamlet soon grew up there. In the next ten years the village was extended to these corners, at any rate on the north side of the road. There were stage lines to Whitby and Newmarket in the sixties and seventies, and to Markham and Uxbridge until 1870. At least one of these lines was owned in Stouffville, and the village catered in every way to horse-drawn traffic.

One of the things that struck people about Stouffville in the mid-sixties was its association "for the apprehension of felons". This had been founded "more than twenty years" earlier, that is before 1846. It had probably been formed to protect the neighbourhood from the "Markham Gang" which had terrorized this district in the early 1840's. This gang seems to have been made up of brutal and sordid ruffians, though most of them belonged to families who had been early settlers in Markham, Pickering, Scarborough, Whitchurch and Uxbridge. Most of the gang lived in these townships, owned some property and were outwardly respectable. Like all such gangs they tried to protect themselves by blackmailing possible witnesses. Nevertheless, a number of them were brought to trial in 1846 for burglary, robbery with violence, forgery and other larcenies. They were reported to have had connections all over this province, in Lower Canada and in several parts of the United States, but this may be exaggerated. Horse stealing does not seem to have been one of their specialities.

A short time before 1866 the Stouffville Association had won praise from the Grand Jury for bringing to justice a gang of horse-thieves. Disposing of stolen

horses was a fine art in those days and this gang was probably much more intelligent and courageous and less brutal than the Markham gang. Such gangs could be dangerous when their safety was threatened. It took courage and cleverness to bring them to book.

The building of the narrow-gauge Toronto and Nipissing Railway was expected to bring a great deal of business to Stouffville. In 1870 the population was about 700 and it was thought that this would be doubled within ten years. This did not happen. The village was incorporated in 1877 and the next census showed 866 inhabitants. There had been a considerable increase in business and when the Lake Simcoe Junction Railway (now abandoned) was built north from Stouffville, this line brought more trade to the village. The built-up area was extended westward some distance beyond the railway, and in 1901 there were 1,223 people in Stouffville. In the next ten years there was some loss of population for much the same reasons as at Markham, but not lasting so long. By 1921 Stouffville was again growing. The last census return in 1951 was 1,695. The latest municipal return is 2,165.

(d) Some Unincorporated Villages

In Markham Township, Unionville is the largest of these villages. Its name celebrates the union of the Canadas in 1841, for the present village owes its existence to mills built soon after that year. The earlier centre of the Berczy settlers was some distance to the north, near the site of the church of 1819. In 1847 the Unionville mills were leased to a Mr. Gillespie. In 1850 Ira White was the owner and miller. Later in the fifties they were sold to H.P. Crosby. The property remained in the possession of the Crosby family who gave the memorial park to the village. There was a second sawmill by 1860 and the village had its share of the usual small industries, many of them owned by the Eckhardt family. It remained a small place with 250-300 people in

the 1860's and early 1870's. After the building of the Toronto and Nipissing there was some expansion and the southern part of the village was occupied. The winding main street of the older part is very picturesque and some of the buildings along it are worth preserving. Unionville has one of the few surviving sawmills in this area, a steam mill which replaced the Eckhardt water mill of 1860.

Claremont, in Pickering Township, was the centre of the early settlement in the Ninth Concession. However, the first building in the village was the stone store built in 1847 on the south-west corner of the crossroads. It was kept by a man named Noble and the settlement was called "Noble's Corners" until 1851, when "Claremont Post Office" was opened. There was then a frame hotel on the north-east corner. Later in the 1850's the existing frame store building was moved from Greenwood and John C. Michell moved his business from the location to the south where he had started it in 1844. He built the fine brick store still in use on the south-east corner. The hotel is gone, but there are three buildings on the corners at Claremont that have probably stood for a century or more. The village had about 250 inhabitants in 1865. In 1890, after the Canadian Pacific line had been built, it was believed to have doubled that number. A second village grew up at North Claremont Station, about a mile from Claremont and the two villages together form a place of fair size and still in a fairly flourishing condition.

Much of the story of Whitevale has been told in connection with its mills. The village began with a sawmill built by John Major in the 1820's. It was first called "Major" or "Majorville". There can hardly have been a village there before Trueman White built his grist mill in 1850 and later added a cooper shop, planing mills and a sash and door factory. Finally in 1865 or 1867 he built his large woollen factory. In the sixties there were a steam carriage factory, a cheese factory and the stave mill already mentioned.

Up to 1870 the village was thought to have about 300 inhabitants. A few years later most of these industries were destroyed by fire and somewhat later the woollen mill was burnt. Since then Whitevale has depended chiefly on the flour mill installed within the walls of the woollen factory. It is still a fairly large village and a remarkably picturesque one.

The first Brougham Post Office was opened in 1836 at Howell's Hollow, south-east of the present village, and this is the village mentioned in that year as having been named after Lord Brougham. It was moved later to "Bentley's Corners", where William Bentley is said to have built the first store in 1835. Brougham had no waterpower and was a crossroads village. In 1857 there were about 150 inhabitants. The chief industry was Bentley & Co's patent medicine factory, later Woodruff, Bentley & Co. Later there was a "Joint Stock Lumber Company", a wooden-ware factory, a planing mill and carriage and waggon shops, but the village depended more on its stores and hotels. In 1854 the Pickering Township Hall was built in Brougham and township meetings were held there instead of at Thompson's Corners. The hall is still standing, but the municipal offices have been moved into the brick store built by William Bentley soon after his arrival. The village seems never to have contained more than 400 people and was possibly smaller after 1890, when the railway drew some traffic from the Brock Road. The headquarters of the Township Agricultural Society was established at Brougham and fairs began to be held there after being held in several different locations in the 1850's. Brougham is still a good-sized village and is growing larger as the population of the township increases.

The villages in Scarborough Township were never as large as those in the other townships. Agincourt until 1870 was a small crossroads village on the "Old Markham Road" near Elliott's sawmill. Some steam sawmills had been

built in the village and near it by 1865. After the opening of the Toronto and Nipissing Railway it developed some importance as a shipping point. A steam grist mill was built and the village extended westward. By 1930 Agincourt was beginning to be suburban. Like all the Scarborough villages it is now in the metropolitan area.

Scarborough in 1850 was a straggling hamlet along the Kingston Road. Within a few years of the opening of the Grand Trunk line a considerable village had been laid out near the railway and in 1870 this became Scarborough Junction. Its population was then about 200. This was largely a railway village and, until the expansion of the city after 1920, never a large one.

Malvern, a crossroads village serving a number of mills at a little distance, was also a small place of about 100-125 people in 1871. Ten years earlier Malvern Post Office had been at Brown's Corners a mile and a quarter to the north. Malvern has continued to serve the same function as in the seventies and will soon be surrounded by modern subdivisions.

Highland Creek was older as a village settlement; the first hamlet was in the valley near the mills, where a fine frame inn was built in the 1840's and torn down about ninety years later. The village originally included the settlements that grew up in the fifties on both hills. Later the western section became the separate village of West Hill. Highland Creek and West Hill have long been suburban and are now definitely part of Greater Toronto.

Goodwood in Uxbridge Township grew up after the improvement of the Stouffville Road. By 1857 it had about 100 people but only Chapman's inn, some stores and a blacksmith's shop are listed. In the sixties there were steam sawmills in the village and the vicinity, a wood and willow-ware factory, carriage and cooper shops. In 1871, when the station was still newly opened, Goodwood was

estimated to contain 90 people. Some of the sawmills had been closed and the village was more dependent on its stores and hotel. However, the railway brought improvement. Goodwood became to some extent a railway village and is still a fair-sized place.

Glasgow farther south was a mill village and when the mills were closed down it shrank to a hamlet. The mills were built in the late 1850's and ran for some forty or fifty years. Glen Major, another mill village, began in the fifties as "Glen Sharrard", changing its name when the mills were sold about thirty years later. Its mills were running after 1900, but the mill ponds have now become the property of a fishing club and the area has for some time been popular for winter sports.

Lemonville in Whitchurch probably had mills in the 1840's and a woollen factory by the late 1850's. Its population seems to have remained at about 100 until the nineties, though there was some fluctuation of the number and type of mills and other businesses. It is now a small place, prettily situated and the area seems to be developing as a location for semi-suburban estates.

CHAPTER 6

THE AREA SINCE 1867

The year 1867, in spite of its importance in the history of Canada, is a rather arbitrary date at which to break off the story of the development of this area. Much of the old life went on into the seventies. The memories of the very old people of today go back to 1867 or a few years earlier and the stories they tell show that in their youth the old ways had not been entirely given up in some parts of this area. There had been many changes since 1860, but in the seventies much farm work was still done by hand labour and a good housewife still prided herself on her storeroom, stocked to a large extent with the products of the farm, orchard and garden processed in her own kitchen, dairy or stillroom. In addition to the preserving and jam-making that continued up to the present day, apples were still dried or made into apple butter, meat was smoked, pickled or salted. Butter was always, and cheese occasionally, made on the farms and the surplus sold in the city and villages. Maple sugar and syrup were still being made in some quantity and fats were still sometimes saved to be boiled into soft soap.

Some wool was still spun and woven at home, now more for bedspreads and rugs than for plain cloth. The custom weaver was still found in some villages up to 1880. In some homes wine and cider were made and cordials distilled from ginger, cherry or dandelion. Good-sized orchards had become the rule by the sixties. In the seventies there was a cider factory near Cedar Grove that is still making pasteurized apple juice. William Helliwell had a cider mill at Highland Creek in the nineties and there were, no doubt, many others in the area. Some of these activities were carried on in village homes as well as on the farms.

However, the influences that were to bring about a change in the life of the area were already at work in the

late 1860's. The seventies, eighties and nineties were a period of difficulty and change for Ontario farmers. In the late 1860's, while grain-growing was still at its height, complaints of loss of fertility on Ontario farms already began to be heard. Farmers had suffered heavily from various pests; some now found that they could no longer grow as heavy crops on their grain ground or produce wheat of as good quality. These deficiencies became more marked after 1870, when Ontario wheat was already feeling the competition of the American West. Before long the Canadian Prairies were also exporting wheat and the price of Ontario wheat began to decline on the Toronto market. One effect of lowered production was an increase in the area of cultivated land achieved by clearing of bushland, and by draining wet lands. In 1863 it was still taken for granted that a settler would clear only about two-thirds of the land he took up, and this was about the average on farms until 1865. In the seventies the proportion of woodland was reduced and underdrainage began to be more common, increasing rapidly in the next twenty years. At the same time there was an increase in the demand for cordwood and, after 1870, an increasing demand for sawlogs of smaller diameter. The old selective cutting had been given up but until after 1880 it was hardly worth while to cut immature trees for lumber or to buy second-growth stands. In the 1870's and 1880's the scarcity of pine was forcing lumbermen to go farther and farther away for their supplies, and a number of other factors combined to hasten the exploitation of the remaining woodlands in the long-settled townships. It was in this very period of the early 1880's that many farmers were feeling the effects of uncertain markets and were, therefore, more ready to sell their woodlots, which had now had time to recover from the lumbering of the fifties. A somewhat similar state of affairs occurred in the 1890's and led to further cutting of woodlots. Where the cut-over land was not taken

into cultivation it now often became part of the permanent pasture and the stock were now sufficiently numerous to restrict the young growth. In many of the older townships there was probably less woodland in the 1890's than at any other decade.

This does not mean that the land was entirely stripped of trees. The "Dutch" settlers had not altogether shared the common pioneer attitude that regarded a tree as a cumbrer of the earth. There were some landowners who cherished their woodlots. Some land was too rough or swampy to be of much use for farming and was kept in bush. In the southern part of Uxbridge Township around Glen Major a good deal of land was evidently never fully cleared and this is true to some extent in the Ridges farther west. Still by 1890 the majority of farms were fully cleared and planting, even of shade trees and windbreaks, had hardly begun.

In this area the effect of these influences was less marked than in other parts of the Province. Exhaustion and erosion of the soil would be found only in a few small areas and on individual farms, but the practices intended to correct them were adopted very early. The dependence on one type of crop had never been complete in Ontario, and in this section it was even less so. The area certainly shared the agricultural depression responsible for the setting up of the Royal Commission on Agriculture of 1880-81. However, the kind of mixed farming, with specialization in one line or another, that was being substituted for grain-growing, had already made considerable progress in the Toronto region before that date. The introduction of cheese factories in 1866 had rather less effect in this area than in most of the Province. Some factories like the one at Whitevale were built, but they were never very numerous. The dairy farmers of the area already had some market for whole milk as well as butter and cheese. Creameries are found in

one or two villages in the 1880's. The farmers already had a good local market for their beef, pork and mutton before 1860. The keeping of sheep grew less common, for very little of the area was especially adapted to it. The local demand for horses, horse-feed and hay was already considerable when other parts of Ontario began to turn, in the 1880's, to horse-breeding for the American market. When the electrification of street railways reduced the demand about ten years later the need for dray-horses and delivery horses in Toronto was already very great. The thousands of horses in the city continued to require great quantities of feed and bedding.

There were still a great many horses in Toronto at the end of the First World War, but the number dwindled rapidly during the next ten years. The outlet for this type of produce was gradually reduced, but its place was taken by others. Market and nursery gardens were to be found very early in the Don area, though some of the best known ones lay just outside. By the 1880's some of these had become important and small-scale truck farming was making progress in some places. Poultry farming was another activity encouraged by the city market. Subdivision of farm land, already noticeable in 1860, was partly the result of a demand for the products of intensive cultivation.

Competition for markets forced the most conservative Ontario farmers to adopt better practices and, as before, this change came earlier in the Toronto area than in some neighbouring regions. Good farmers were the rule in the area, and the standard continued to be high. Something has been said of the activities of the early Agricultural Societies. These began in the 1830's and 1840's. By 1850 they were receiving help and encouragement from the Government and this continued into the seventies when it took a rather different form. Annual ploughing matches were held in Pickering Township from 1849. They were held at different localities, Greenwood

often being chosen in the 1850's and developed into agricultural exhibitions. The location of these fairs was finally fixed at Brougham. Similar exhibitions in Markham Township became fixed rather earlier at Markham Village. The efforts of individual farmers to improve the breeds of stock continued in this period. The names of a number who distinguished themselves in this way were recorded in all the townships about the turn of the century. By the seventies many farmers were specializing in purebred animals and the keeping of good herds became more common in the next fifty years.

By 1871 a decline in rural population begins to be noticeable. Except for Uxbridge Township, which had its highest recorded population in 1871 (4,762), the peak of township population is recorded in the provincial Census of 1861. Even allowing for the acknowledged inaccuracy of this census, all the townships lost heavily in the seventies and still more heavily in the two following decades, though the loss in Markham Township in the 1870's can be largely accounted for by the incorporation of villages.

The widespread decline in rural population in Ontario during the last quarter of the nineteenth century is often set down to the emigration to the West. This played a considerable part in the movement, but in this area the attraction of the city must have been at least equally strong. Neither of these influences would have produced such a marked effect if it had not been for a decline in rural prosperity, a change in farm economy and a definite reduction of lumbering. The decline in prosperity made the support of part of the population difficult at the same time that the increased use of machinery reduced the number of hands needed on the average farm. Mechanization did not have its full effect until after 1880, when the binder came into general use, but the shortage of labour was already developing in the 1870's and increased the use of machinery on the farms. After 1890 decline of the

village population hastened the trend, which continued until after 1911. The rapid growth of Toronto after 1920 soon began to affect Scarborough Township. There had been some recovery in the other townships by 1941, but it was not until very recently that the population of Markham and Pickering Townships equalled that of 1871.

This decline had been more marked in Pickering and Whitchurch Townships and the recovery slower. In Uxbridge Township the loss of population began some ten years later and lasted ten years longer. Even in 1951 the population recorded by the Census (2,033) was less than half that of 1881 (4,081). Recent municipal returns indicate a slightly faster growth in this township since 1951. In both Uxbridge and Whitchurch there were unexplained gains between 1911 and 1921 and a corresponding drop in the 1920's. These fluctuations can be followed on the graphs at the end of this chapter, which also indicate the extremely rapid gains in some of the townships.

Some of the causes for the decline of village population have been mentioned in connection with the larger villages. It was even more marked in the case of villages with 50 to 100 people. These villages maintained themselves into the 1890's, in spite of the reduction of lumbering that was one of the causes of the decline of the rural population. As more of the mills were closed these villages depended more on their stores and the partial depopulation of the surrounding area was depriving the storekeepers of some customers. At the same time they were beginning to feel the competition of large city firms before the motor car brought the city within easy reach. The mail-order catalogue was already to be found in most houses before the turn of the century.

On the whole the smaller villages have fared better in this area than in some others parts of Central Ontario. Signs of former prosperity were more noticeable thirty years ago, before the motor-car and the expansion of

the city had had much effect on the area except in Scarborough. Very few village sites have been entirely abandoned. Some crossroads villages dwindled almost to nothing when the last store was given up and the post office replaced by rural delivery. Among them were the two "Brown's Corners" and Cashel, possibly the first village in Markham and, as "Crosby's Corners", the second post office. It is possible that the decay of the villages would have been more marked in a more purely rural area and one where fewer mills survived into the motor age. Besides, the decline of farm population, though marked, was less here than elsewhere. In most of the area there has not been much increase in the size of farms since 1875. There has been a reduction of manpower per acre of cultivation and in the size of the average family, but in most of the area empty houses have never been numerous.

While life in the city was changing rapidly in the last quarter of the nineteenth century, the change in rural living was much slower. There were many small improvements, but the fundamental arrangements were little altered. Social life was better organized and the steady improvement of communication gave greater opportunities, but the occasions for social intercourse were much the same as before. After 1895 a good deal of "modern comfort" was available to the average city dweller of moderate means, though in a rudimentary form, but its installation in a country house was still costly and the upkeep very troublesome. Most people, even in the villages, still had to do without gaslight, central heating and inside plumbing. The rural telephone was the first great improvement, to be followed in this century by rural electricity. It was electricity and the motor-car that largely closed the gap between the living standards of the city and country and made possible the great suburban development of the past twenty-five years.

The steady expansion of Toronto into the southern part of the area poses a problem in regard to the relics of the past, that is not felt so urgently by most other watershed authorities. This area is especially rich in such relics. A certain amount remains from the early period before 1830, and still more from the period of expansion in 1840-67. A great wave of building was going on at that time and has left buildings of all sorts, but particularly houses. Some of the houses and churches still in use are in little danger of destruction or of serious damage. Some might be preserved on their present sites; others must inevitably be destroyed to make way for new development.

As has been indicated in the Recommendations, the preservation of such relics is to be regarded as a form of conservation. At present a Conservation Authority is almost the only body in a position to do anything effective in this matter, though it is to be hoped that this situation may soon be altered. An Authority can make a site available in one of its conservation areas, to which buildings can be moved that cannot well be preserved in their original locations. It can contribute a large share of the cost of establishing and maintaining a "museum village", and of providing buildings to house smaller relics and documents concerned with the history of the area. It can often make a building or group of buildings of this kind the nucleus of a conservation project and it can, and should, see to the preservation of any objects it may acquire in purchasing land for such projects.

It would be desirable and quite possible to set up one or two such sites in the area, preferably at least two, for a building loses much of its significance if moved too far from its location, and becomes a mere museum exhibit. The object of such projects is to maintain an interest in local history and to attract visitors to different parts of the area. This would be defeated by too much centralisation, especially

by moving objects from Markham and Pickering Townships to a site within the Metropolitan area.

Certain sites immediately suggest themselves to anyone familiar with the area. In Markham Township, the most obvious is the Bruce Mill, the only early flour mill surviving in anything like its original condition and containing one of the few mill wheels still in place in Ontario. There is reason to hope that some arrangement to preserve this mill may be arrived at before long. The Authority should do all it can to further this project, either by acquiring the property, or assisting any other body that may be willing and able to do so.

Another location is to be found at Cedar Grove. Here there is a long stretch of the beautiful valley of the Little Rouge, quite unspoiled and surrounded by farmland also in an unspoiled state. The whole area is of historic interest. It contains some Indian sites and part of the Rouge Trail. It was the location of a colony of Mennonites, whose descendants have retained some of the customs and many relics of their ancestors. The mill site at Cedar Grove was one of the first mills on the Rouge. This stood on part of the old Rouge Road. The mills are now only marked by some embankments, but on the hill to the north stands the stone house built by Peter Reesor about 1830, with the frame barn dated 1831. These stand near the crest of the steep and high bank, looking over the valley. A little thinning and pruning of the trees would produce beautiful views. Behind the buildings there is reasonably level ground, where other buildings could be located. The house itself is of considerable interest, representing a type not common in this part of Ontario. It is occupied at present, and could be restored without excessive cost. The barn is in even better condition and would serve admirably to house farm implements and vehicles. Around the house are many fine trees, some of rather unusual species. The garden to the south needs only a little pruning and planting to be made most attractive.

Paths could easily be made along the banks through the woods.

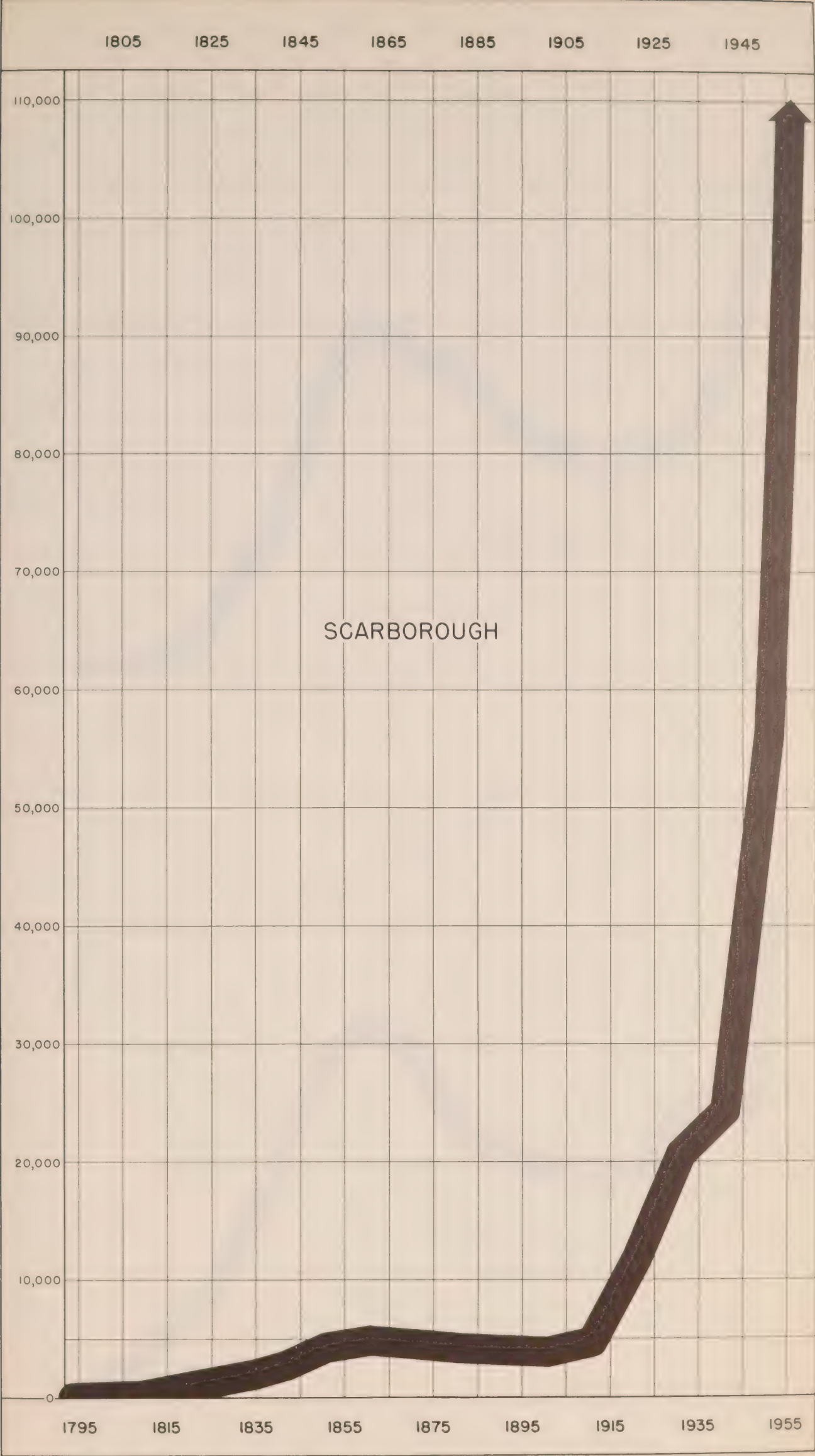
Though the Peter Reesor house would itself make an admirable project, it should be combined with a larger scheme to protect much of the valley and some other items of historical interest in the vicinity. This might include some reforestation. Another site in Markham Township is the site of the Milne Mills. As far as the site of the mills themselves is concerned, this would be a recreation or flood-control project, but if the old Milne house on the hill to the west could be included in the scheme it would preserve a building of great historic interest. In this case, unfortunately, decay has gone so far as to make the project more difficult. However, if the house cannot be restored at reasonable cost, the interior trim, mantles, doors, sash and other fittings should be saved and used in a new building. The grounds of this house might also serve for a museum village.

In Scarborough Township the most obvious group of buildings in need of protection are St. Andrews Church, Bendale, and the adjoining buildings, including some houses west of the church. The church, with the buildings immediately surrounding it, is probably not in danger; but the area around them is definitely threatened. To preserve what is left of this old "given" road and the little valley along which it runs, seems desirable in itself; but this unique group, which includes the old Mechanics Institute Library, can be combined with a scheme to preserve the Indian village site not far off, and incidently the site of one of the early sawmills. Such a project would form a monument to the early history and settlement of the township.

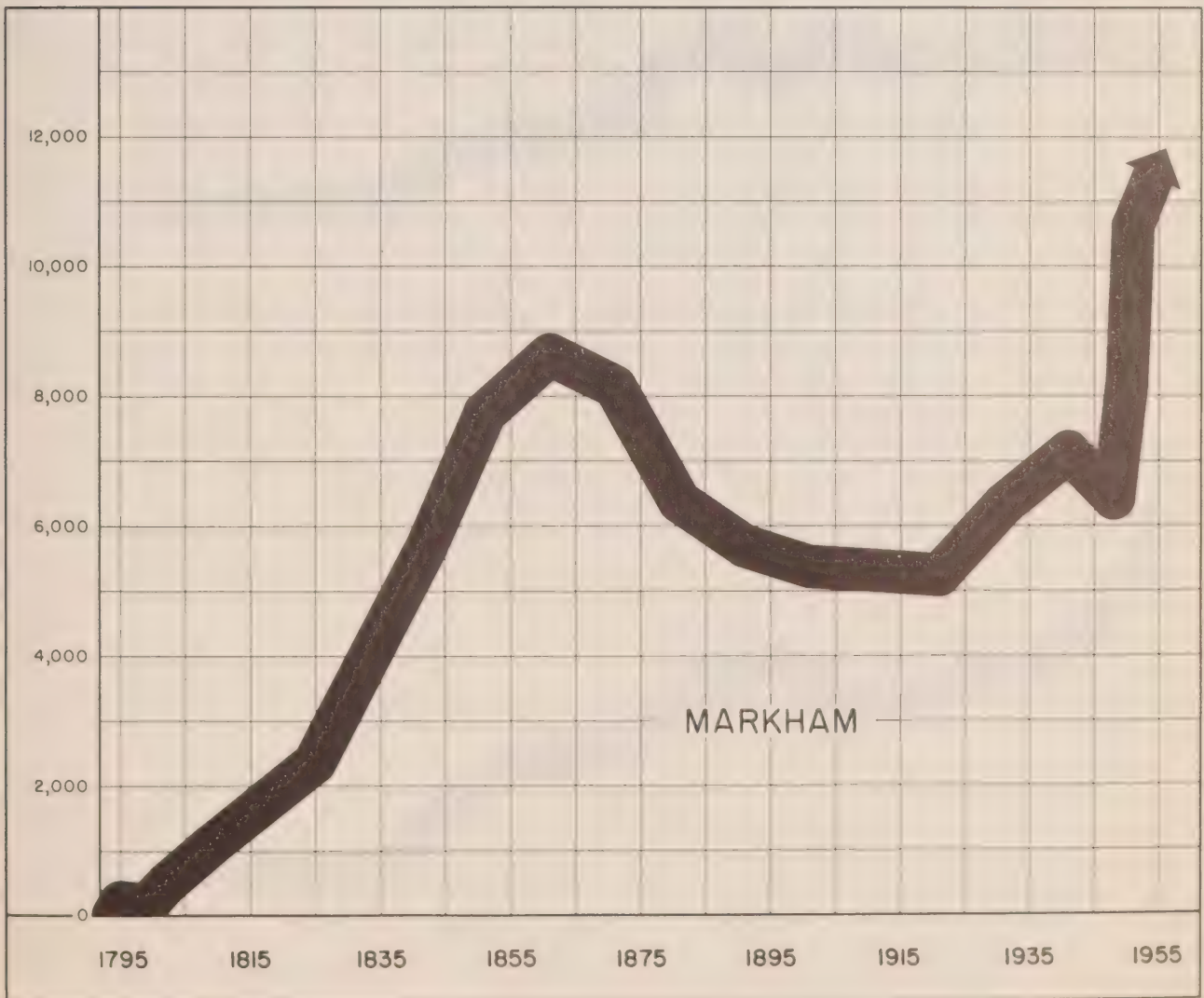
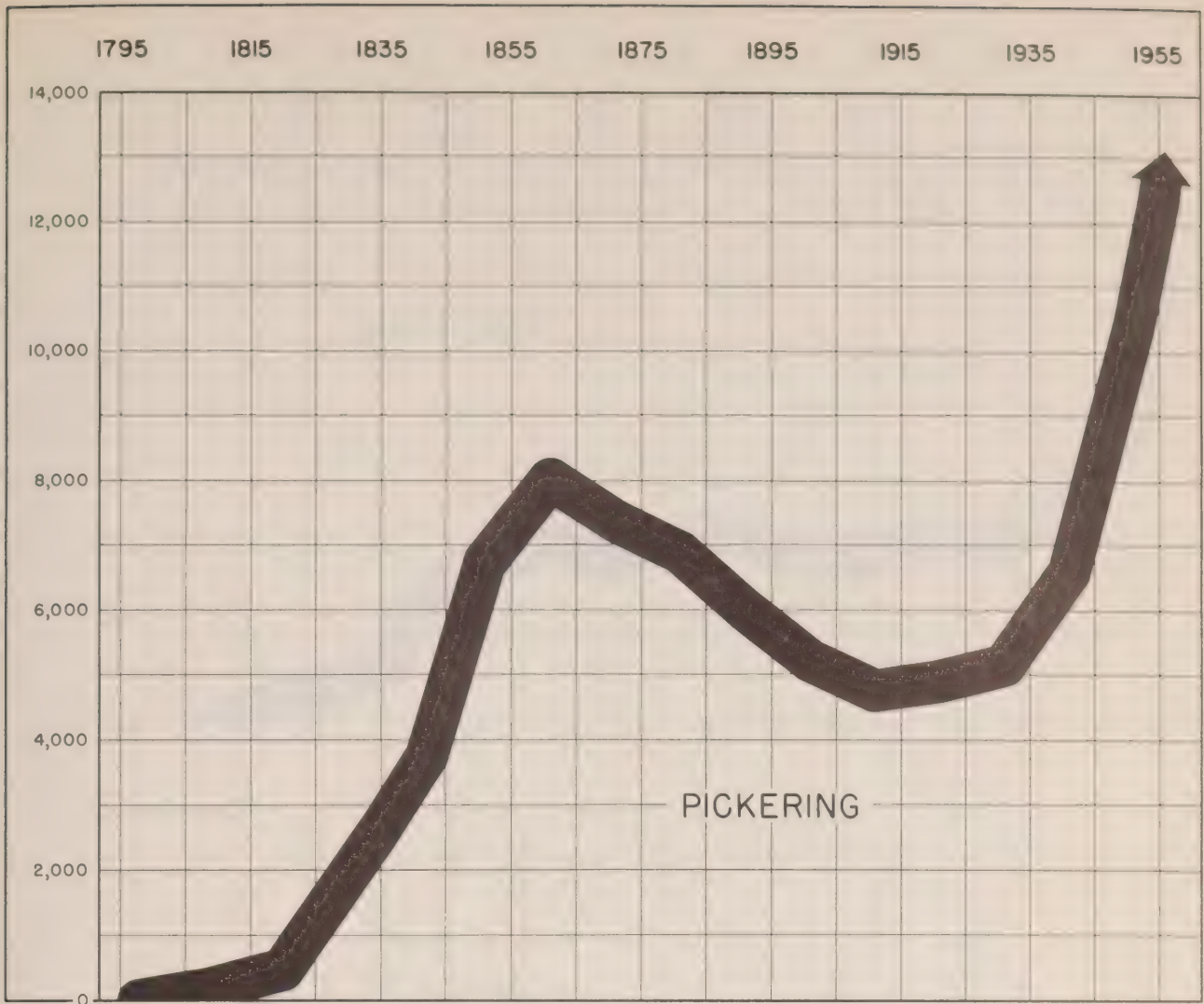
There are, of course, a number of alternative sites in Markham and Scarborough that might be used for this purpose. There are perhaps fewer obvious sites in Pickering

Township, though some could be found where an early building might be included in an attractive conservation project. One possible site, should it become available, is the stone house east of Claremont, in the Eighth Concession, where the artist, Tom Thomson, was born. This house stands a little south of the Ninth Concession Line. It dates from around 1850, possibly a little before, and was built by Thomas Thomson, grandfather of the artist. It is not much altered and the stone cottage, to which Thomas Thomson retired before his grandson was born, is also standing north of the older house, although the interior has been removed. These buildings would make the nucleus for an historic project. There is a fine view from the site and a small stream to the east. A good deal of reforestation might be included in the scheme. This house and buildings are not likely to become available immediately, possibly not for some time, but the Authority should be on the alert to acquire them if this becomes possible.

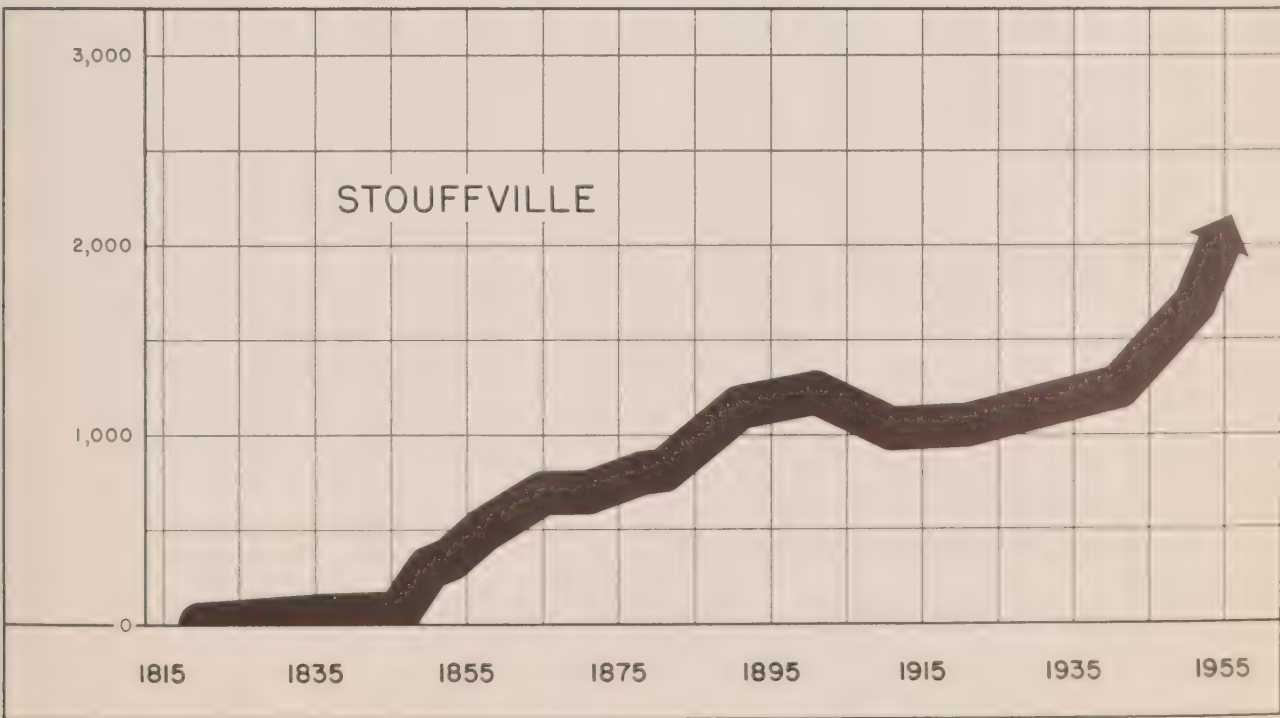
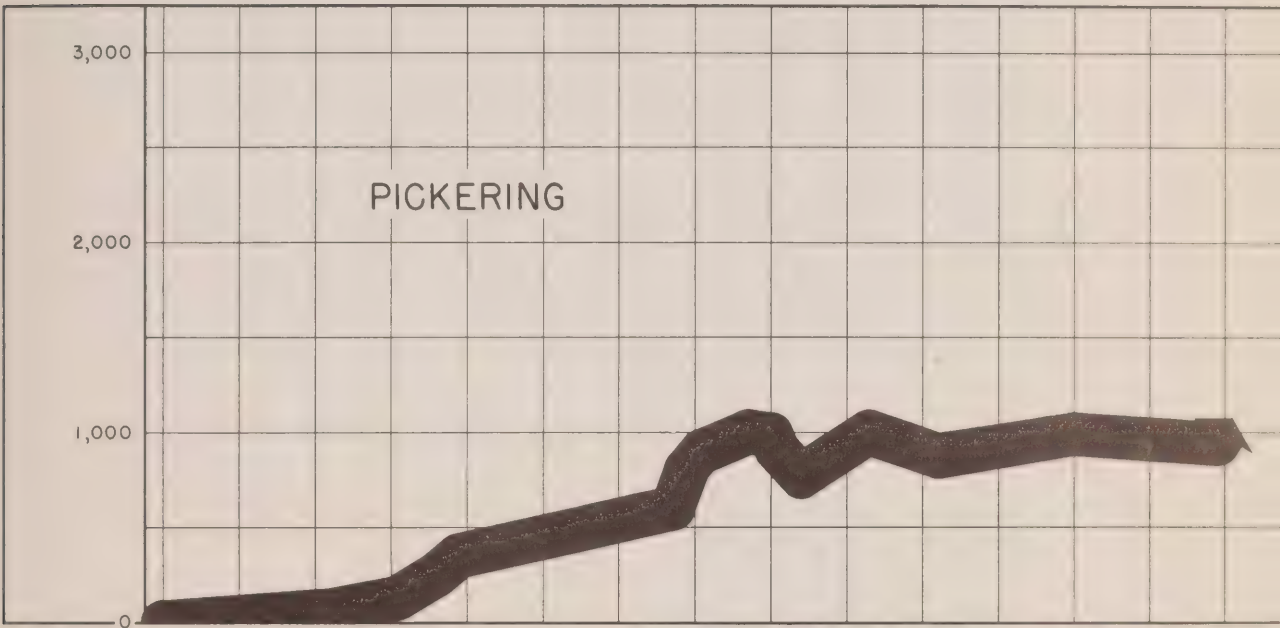
These schemes are put forward as suggestions rather than actual recommendations. There are other activities in this connection that might be carried out by the Authority. Sites of local historic interest should be marked, particularly the older mill sites, roads and trails. The marking of sites of more general historical interest might be left to the Provincial Government, which has made a beginning of this work. A study of the area to discover and record historical material is badly needed and might be carried out with the assistance of the Authority. To make a beginning of the preservation of documents, the Authority might acquire two or three steel cabinets (one with a small safe) and let it be known that papers and some books and pictures would be welcomed and placed in safekeeping. A location for these cabinets might be found at little or no expense to the Authority.



TOWNSHIP POPULATION



TOWNSHIP POPULATION



VILLAGE POPULATION

LAND

CHAPTER 1

THE PHYSICAL FEATURES

The area encompassed by the streams included in the R.D.H.P. Authority lies chiefly in the townships of Whitchurch, Markham and Scarborough in York County and in the townships of Uxbridge and Pickering in Ontario County and for the purposes of this report the whole is defined as a watershed.

The watershed has a maximum elevation of about 1,100 feet in the north-east and it reaches a minimum of 245 feet at Lake Ontario. The land features that lie between these two extremes in elevation are almost entirely the result of glaciation occurring some 25,000 to 30,000 years ago.

During this glacial period two separate lobes of ice occupied this portion of Ontario. The one lobe had its centre in the present Lake Ontario basin, while the other lay to the north of what is termed the Oak Ridges. The latter, an extensive belt of sandy and gravelly hills which stretches from near Orangeville to Rice Lake, is an interlobate moraine which resulted from an accumulation of material between the two lobes. A considerable proportion of the interlobate materials is outwash; the meltwaters from the ice carried heavy loads of sand and gravel which they deposited in the inter-ice area.





South of the Oak Ridges glacier action resulted in the formation of a till plain of relatively small relief. The till is unstratified and composed of ice-ground rock powder interposed with coarser rock fragments of various sizes. Subsequently this area was modified greatly through lake action and stream dissection.

As the Ontario lobe retreated the meltwaters accumulated between the body of ice and the Oak Ridges. This



PHYSIOGRAPHY

— LEGEND —

	KAME MORaine		DRUMLINIZED TILL PLAIN
	BEVELLED TILL PLAIN		SAND PLAIN
	CLAY PLAIN		BOULDER PAVEMENTS
	BEACHES AND SHORECLIFFS		DRUMLINS

SCALE — MILES



ponding was relatively shallow but existed for a long enough time that the basal till could be modified or covered by further water-laid deposits.

Continued recession found the ice lying athwart the St. Lawrence in the vicinity of the Thousand Islands. At this time the Ontario basin was ice-free but occupied by the waters of Lake Iroquois, a considerably larger lake than the present Lake Ontario. Iroquois existed for a long time and created a well defined shoreline. On the R.D.H.P. Watershed this shoreline runs from the Scarborough Bluffs to a point approximately two miles south of Greenwood. Along this shoreline sandy beaches and offshore bars were built. Further off shore a layer of clay was deposited in the bottom of the lake.

With the disappearance of ice from the St. Lawrence valley the waters of Lake Iroquois receded because of a lower outlet and the stage was set for the creation of present Lake Ontario. The disappearance of ice and water from the lands of the R.D.H.P. Watershed also allowed normal stream dissection to take place and the present valleys were subsequently formed.

From north to south the lands of the watershed may be divided into five sections or belts, each of which is different with respect to origin and form. The portion of the watershed within York County contains all five of these belts, while that portion lying within Ontario County possesses only four.

From the north the five belts are: the Oak Ridges, the Rolling Plain, the Shallow Clay Plain, the Sand Plain and the Deep Clay Plain.

1. The Oak Ridges

The Oak Ridges are a series of ridges and tumbled hills of gravel and sand with few streams and steep

slopes. This is the source of the Rouge River and the Duffin Creek. The soil is sandy, well drained, subject to drought and relatively infertile. Consequently the area is used chiefly for grazing, forestry and as a source of gravel.

In York County the Oak Ridges takes the form of a high east-west ridge rising abruptly from the plain to the south, while in Ontario County it is a jumble of hills extending from just north of Claremont to the northern boundary of the watershed.

2. The Rolling Plain

The materials of the Rolling Plain were formed from rock materials ground up by the ice and then redeposited subglacially. The region is characterized by low whale-back hills so distributed that their long axes point in a north-west to south-east direction. These hills have smooth slopes suitable for contour ploughing. The south part of this region is the source of the Highland and Petticoat Creeks.

The soil of the area is fertile, loamy and usually well drained. It is used for general farming but is susceptible to erosion.

In York County the Shallow Clay Plain forms a deep, broad, eastward-extending embayment in the Rolling Plain which flanks it on the north, east and south. At the foot of the Oak Ridges there is a belt of swamp land which is the source of some of the tributaries of the rivers. There are few abrupt slopes and few deep valleys.

In Ontario County the drop from the Oak Ridges to the Sand Plain is twice as steep as that in York County. For this reason the Rolling Plain is deeply dissected, slopes are steeper and thus more open to serious erosion. The steep-sided valleys are usually wooded.

3. The Shallow Clay Plain

The Shallow Clay Plain is much flatter than the Rolling Plain but occasionally the underlying material protrudes through its surface veneer to form low hills. The clay soils are inadequately drained and, where sloping, are subject to serious erosion. Dairying, beef and general farming are to be found in the area.

This region is located almost completely in York County.

4. The Sand Plain

The Rolling Plain is separated from the Sand Plain by a shore cliff formed in glacial times and the change from one to the other is startling. The latter area is wild-looking, with boulders and sand scattered over the surface. Trees and scrub cover much of the area. Many shallow gravel pits have been excavated in the beach deposits left by Lake Iroquois. The area has also become important for Toronto suburban development.

The Sand Plain has been deeply dissected, especially by the Rouge River and Highland Creek whose valleys are used for recreational purposes.

5. The Deep Clay Plain

The Deep Clay Plain lies entirely in Ontario County and through it Duffin Creek flows sluggishly from Pickering to the Lake. Heavy, poorly drained clays predominate. General farming and urban growth are characteristic. The recent development of the Town of Ajax may be taken as an example of the latter. The few low hills protruding above the general level are the best land for agriculture because of improved soil drainage and a variation in the soil type.

CHAPTER 2

INTRODUCTION

1. Little Valleys

Soil and water are shared by many people. The water of a small stream may flow down a big river many miles away and the products of the soil may be sold in cities hundreds or thousands of miles away. The use of the water and the soil is a local matter. The land of a small community and the water in a small stream are shared by the people of one small valley. Improving soils and streams is a community project as well as a private program. Therefore a good starting place for a soil and water conservation program is in one Little Valley.

Improving one little valley has several advantages. First, the results can be shown directly, partly in the better production on the land and partly in the better flow in the stream which is shared by all in the valley; therefore it provides a good demonstration to people in the whole region. Secondly, the accumulated result of conservation measures is greater when they are applied on neighbouring properties. Thirdly, as new methods are introduced people get skilled in applying them and can help their neighbours. Fourthly, people sharing a task are more enthusiastic than individuals working alone. A fifth advantage is that some conservation measures require sharing special equipment, such as grading machinery for healing gullies or grassing waterways, or pooling labour as in tree planting or cleaning out a woodlot. These things can be done more effectively where there is a concentrated effort, especially if someone is brought in to advise on technical matters.

2. The Selection of the Little Valley

The control of any river system, like the Rouge or the Duffin, starts at the headwaters with the little tributaries. A demonstration project should be in an area

which is typical, or nearly so, of conditions found throughout the larger watershed. How, then, are the little valleys chosen?

First, they must be in areas where the people are aware of soil and land use problems and are keen to work together to do something about them. Then they should contain a good cross-section of typical conditions, not necessarily the most extreme problems. Finally, they should be of a convenient size to work with.

The little valleys chosen to represent typical conditions and to suggest and demonstrate corrective measures on the R.D.H.P. are Little Rouge Creek and Claremont Creek. These two valleys belong respectively, to the Rouge River and Duffin Creek, the two major streams of the R.D.H.P. The former lies in York and the latter in Ontario, the two counties which contain the R.D.H.P. The two little valleys also contain two quite distinct types of land surfaces; in the one case it is level to gently rolling; in the other it is deeply dissected and quite hummocky.

It is hoped that the people on the land, the Conservation Authority and all agencies carrying out scientific work in land use will co-operate in an effort to extend or create good land use practices and adopt methods of improving the soil, checking soil depletion and erosion and husbanding the water resources of the valleys.

Before a little valley scheme can be inaugurated it is necessary to make an inventory of the soil and water resources. Until this is done no fruitful plan of development can be made. Such a survey was carried out in the summer of 1954 by the Conservation Branch and from the findings certain recommendations are made. The next steps will be to acquaint the people of the valley with the project and begin to carry out some of the proposals.

3. A Description of the Two Valleys

(a) The Little Rouge Creek

Little Rouge Creek embraces, in this Report, the Little Rouge Creek and all of its tributaries north of Highway No. 7. The main stream rises at 1,000 feet above sea level in Lot 10, Concession VI, Whitchurch Township, and reaches the highway $\frac{1}{4}$ mile west of Locust Hill at an elevation of 625 feet.

The stream is 11 miles long, while the watershed itself is approximately 9 miles long by 4 miles wide at its widest point. It has an area of 21,318 acres and lies entirely within the boundaries of Markham and Whitchurch Townships of York County.

The stream and its tributaries rise on the southern slope of the "Oak Ridges". This is the local name for a series of gravel hills and ridges which extend from Orangeville on the west to Rice Lake on the east.

From their sources the stream and its tributaries drop 120 feet in the first half-mile and then flow across a rolling plain. This plain is characterized by whale-back hills, the long axes of which lie in a north-west to south-east direction.

The rolling plain is terminated on the south-west by Little Rouge Creek itself. South-west of the Creek there is a plain, much more level, the surface of which is composed of clay laid down in the bottom of a shallow post-glacial lake.

Some idea of the surface of each of these three physical features can be gained from the fact that the gradient of the stream is approximately 240 feet per mile on the Oak Ridges, 40 feet per mile on the rolling plain and about 20 feet per mile on the flat plain.

The Little Rouge Creek is fed by springs on the side of the Oak Ridges and by a broad belt of swamps and springs in Lots 6 and 7 of Concessions V, VI, VII and VIII, Whitchurch Township.



Overuse and misuse of light land can produce serious wind erosion and creeping encroachment on neighbouring property. In cases like this strong measures are called for, and the land should be returned to permanent vegetation.



Class I land, left, and Class II D land, right, may appear the same on the surface. With adequate drainage the Class II D land might be treated as Class I land.

The valleys contain different kinds of land, each of which may need different forms of use or intensities of use to be farmed safely.



The valley is 70.5 per cent cultivated, 26.3 per cent uncultivated and 3.2 per cent in residential use. In 1954 the major crops grown were spring grain (26.5 per cent of the area), hay (21.3 per cent), pasture (17.8 per cent), winter grain (12.0 per cent) and woodlots (7.8 per cent).

(b) The Claremont Creek

Claremont Creek is the name given to the tributary of Duffin Creek which meets the main stream in Lot 12, Concession VII, Pickering Township. Like Little Rouge Creek, Claremont Creek also rises in the Oak Ridges; in Lot 1, Concession III and IV, Uxbridge Township. From the Oak Ridges the stream and its tributaries flow across a rolling plain similar to the one to the west.

Though Claremont Creek is only 5 miles long, it has a total drop of 425 feet, or 85 feet per mile. Due to this the land surface is deeply dissected by the stream and its tributaries.

This feature, in part, explains the fact that only 49.9 per cent of the total area of 6,200 acres is cultivated. Here the largest uses are pasture (30.6 per cent of the total area), spring grain (19.3 per cent), hay (18.2 per cent), woodlots (12.4 per cent) and winter grain (6.4 per cent).

4. Methods of Survey

The survey was carried out using a combination of detailed and reconnaissance mapping. The base maps used for the survey were large-scale aerial photographs. On the photographs covering Little Rouge Creek, survey teams mapped soil types, drainage, approximate slope and estimated erosion, and present land use. From this detailed information a Land Capability Rating was worked out. This rating was then applied to Claremont Creek on a reconnaissance basis. Later the mapping of Little Rouge Creek was consolidated into the Land Capability Rating.

5. Aim of This Survey and Report

The primary aim of this survey is the identification and mapping of land of varying capabilities.*

If the residents of the little valleys can work together to improve their most important assets, soil and water, they will provide a valuable demonstration to all other residents of the R.D.H.P. as to what might be done in the rest of the watershed.

6. The Conservation Program

Soil and water are resources in which most people are vitally interested. The relationship between the two is a close one; good soil management improves water resources and good water management improves the fertility of the soil.

Soil kept at its best has a good structure, and this is maintained by supplying adequate amounts of organic material. This organic material, in turn, acts as a sponge in absorbing surface water, thus decreasing surface run-off. Increased moisture in the soil improves fertility and also ensures recharge of the ground water. If ground water tables are raised, the flow of springs and streams will be more permanent and the habitat for fish will be improved.

The use of terraces, contour cultivation or cover crops helps retard from run-off the unabsorbed surface water and gives it greater opportunity to soak into the soil. This means that little soil will be carried from the surface of the fields and deposited in neighbouring fields or in ponds.

The conservation program should not be a series of unrelated efforts on behalf of forests, wildlife, soils and water. In fact, the proper conservation of forests is beneficial to soil, water and wildlife resources, the proper conservation of soil helps water resources and the proper management of water is important to soil conservation.

* Now that this has been done it is hoped that an even closer correlation of land use to capability will result on the two little valleys. This closer relationship should improve the interrelation of man, soil and water.

CHAPTER 3

SOILS

1. The Soil Profile

The soil is made up of distinct levels called "horizons". These horizons have developed from the interaction of climate, plants and animals on the surface mineral matter which, in Southern Ontario, is of glacial origin. Different types of soil are identified by the varying physical and chemical characteristics of their horizons. A vertical section through these layers is termed a soil "profile". The profile extends down to the unweathered and unaltered material from which the soil above was formed. This unaltered parent material is termed the C horizon and generally lies at a depth of several feet below the surface. The profile of a typical well drained soil in Southern Ontario is here described.

Horizon

- A₀ - Decayed vegetation
- A₁ - Dark brown or gray material - loose, friable, containing humus and mineral material. Slightly acid in reaction.
- A₂ - The leached horizon has no humus. The iron, lime, organic matter and clay have been washed out. Light gray to yellow in colour and dusty in texture. Acid in reaction.
- B - This is the zone of deposition in which the materials washed or leached from the A₂ accumulate. May be acid to slightly alkaline in reaction. Brown colour and blocky or nut-like structure. Free lime carbonates are found at the bottom of the B horizon.
- C - This is the unweathered parent material. The colour is grayish, and there is no structure as in the B. Free lime carbonates are found.

Decayed plant material or humus is incorporated into the topsoil. Acids are formed during the process of decay and are washed down through the soil by the rain. Lime, iron, organic matter and fine clay particles are leached from the A₂ horizon by the acid solutions and redeposited in the B horizon below. The B horizon, as a result, has a higher clay content and is dark brown to reddish brown in colour. Under cultivation the A₁ and A₂ may be mixed together. The

resulting horizon may be called the A_c (cultivated) horizon.

In imperfectly drained soils the A_1 is deeper because the humus does not break down so rapidly when wet. Moreover, when the water table fluctuates near the surface the action of water washing down is not so great. As a result, the A_2 , or leached layer, tends to be shallower and often is entirely absent. When the soil is wet the iron oxides are chemically reduced and have a blue-gray colour instead of the characteristic brown colour of a well drained soil. Thus the subsoil is a blue-gray or a mottled brown and gray.

2. Catenas, Series and Types*

The origins of the various parent materials of the two little valleys have already been described. Soils that have formed on the same type of parent material belong to the same "catena". The drainage of the soil, however, makes certain differences in the profile of the soil. A catena usually contains a well-drained member, an imperfectly drained member and a poorly drained member. Each member of a catena is named for the location near which it was first identified and described, e.g., Cashel, Milliken, King. The well-drained member of a catena is usually used as the name of the catena.

The genesis of the three distinct physiographic types within each of the two little valleys has already been discussed. Each of these three regions has characteristic parent material.

(a) Soils Developed on Water-Deposited Sands

These soils are to be found in and on the flanks of the Oak Ridges Moraine. They fall into two main groups, the well-sorted sand and the poorly sorted sand. Generally speaking, the well-sorted stratified sands and gravel were

* The soil maps of York and Ontario Counties were kindly made available by the Ontario Soil Survey at the Ontario Agricultural College, Guelph. The terms and names used here are the same as those used by the Soil Survey and by the Soils Department at the College when doing extension work on farms.

deposited on the ground by meltwater from the glacier. The poorly sorted sands were deposited by water either on or in the glacier and were dropped to the land surface when the ice melted.

The Brighton catena has been formed on the well-sorted sands while the poorly sorted sands are the parent material for the Pontypool catena.

(b) Soils Formed on Till

Till is the name given to the mixture of sand, silt and clay deposited under the ice by the forward movement of a glacier. This material was moulded by the ice into long flutings or whale-back hills which lie in the direction of ice movement. Till, in which silt and clay particles predominate, forms the parent material of the King catena while that in which silt, sand and gravel predominate has been the site of the development of the Woburn catena.

These catenas are found in the Rolling Plain in both the Little Rouge and Claremont Creek valleys.

(c) Soils Formed by Standing Water

In the Little Rouge Creek valley there is a large area of the Shallow Clay Plain. As explained before, this was the site of the ponding of meltwater from the retreating glacier. As a result, clay was laid down over the till in this area. Thus the soils found here are predominantly clay but in some areas where the clay is shallower the subsoil is till. The chief catena in this area is the Cashel catena.

The following table outlines the chief soil types found in the two valleys.

TABLE OF SOILS OF LITTLE ROUGE AND CLAREMONT CREEK VALLEYS

Parent Material	Catena	Series	Drainage
Well-sorted sands	Brighton	Brighton Brady	Good Imperfect
Poorly sorted sands	Pontypool	Pontypool	Good

(continued)

Table of Soils of Little Rouge and Claremont Creek Valleys (contd.)

Parent Material	Catena	Series	Drainage
Fine-Textured Till	King	King Monaghan	Good Imperfect
Medium-Textured Till	Woburn	Woburn Milliken Lyons	Good Imperfect Poor
Clay underlain by Fine Till	Cashel	Cashel Peel Malton	Good Imperfect Poor

3. Gleizolic Soils

Gleizolic soils are the series of the above-mentioned catenas which suffer from imperfect or poor drainage. This may be caused by flatness of the soil surface, impermeability of the soil materials, or a high water table.

Excess of ground water in the soil fills up the air spaces needed for good plant growth and prevents the escape of organic acids which in excess are harmful to plants and to soil organisms. These soil organisms are extremely important to the soil in that they break up organic matter, help keep soil friable, and make certain minerals such as nitrogen available to the plants.

Gleizolic soils may be recognized by the colour of their lower horizons. In the imperfectly drained soils the B horizon may be discoloured by orange and reddish mottlings. The poorly drained soils may lack an A₂ and B horizon and have in their place a brownish-gray mottled, mineralized layer topped by a black to dark gray A₁ horizon containing a large amount of organic matter.

4. Identification of Erosion

Soil erosion is the removal of the topsoil by wind or water from the place in which it was formed. In any soil a certain amount of erosion necessarily takes place under

natural conditions. However, the amount of topsoil lost by this geologic erosion is easily replaced by soil-building activity at lower levels. It is when surface erosion exceeds the speed of soil building that the situation becomes serious. On all land this can take place when the soil is cleared of its vegetation cover and is cultivated.

The easiest way to identify erosion is first to find an undisturbed corner of a field or woodlot and there measure the depth of the topsoil. Then all that is required is to compare this depth with that of the topsoil in cultivated fields. In the types of soils found in these valleys a little dilute hydrochloric acid will indicate the parent material. The acid will not fizz when it comes in contact with the topsoil but will fizz when it is dropped on the lime-rich parent material.

5. Soil Descriptions

(a) The Brighton Catena

Small areas of this type are found at the foot of the Oak Ridges in the Claremont Creek valley. The surface is smooth to gently sloping and the profile consists of four inches of dark gray-brown sandy loam over well defined sand horizons. The parent material is a gray calcareous sand. The chief difficulty with this soil is the droughtiness, due to excessive internal drainage, lack of organic matter and the danger of wind erosion.

(b) The Pontypool Catena

This is the predominating soil of the Oak Ridges portions of both valleys. The surface is irregular and steeply sloping. Like the Brighton it has a four-inch dark grayish brown A₁ horizon underlain by well developed A₂ and B horizons. The parent material is sand with occasional pockets of gravel.

This soil has the same disabilities as the Brighton and too frequent cropping can result in areas of blow sand. The chief uses of this soil are for reforestation,

pasture, potatoes, and some hay and grain.

(c) The King Catena

King clay loam is found mixed with Woburn loam in the Rolling Plain. It is topped by six inches of grayish-brown clay loam over a well developed profile. The B horizon is **blocky**, and chocolate brown in colour.

The chief problem with this soil is water erosion on sloping land. Spring grains and hay form 63 per cent of the present land use of the cleared area of King clay in a sample area of the Little Rouge Creek. Eighty-seven per cent of this area is cultivated.

Monaghan clay loam, the imperfectly drained member of the King catena, is found in depressional areas and differs from King clay loam in that the B horizon is mottled.

Despite the imperfect drainage 77 per cent of the cleared Monaghan in the sample area is cultivated, with 52 per cent in spring grain and hay.

(d) The Woburn Catena

The prevailing catena on the Rolling Plain in both valleys is the Woburn catena. Its well-drained member, Woburn loam, contains few stones and has a six-inch dark brown loam A horizon over well-developed horizons.

Though this soil is closer in texture than the King clay loam it is still susceptible to erosion on steeper slopes. The coarse texture ensures good drainage and makes the soil ideal for early working in the spring.

Seventy-eight per cent of the sample area of cleared Woburn is cultivated and 57 per cent of this area is in spring grain and hay.

The imperfectly drained member of this catena is Milliken loam which has a very dark brown A₁ horizon and mottled A₂ and B horizons. Erosion is not a major problem in this soil and internal drainage, though imperfect, is not restrictive. As a result its use is almost identical to that of the Woburn.

Lyons loam, the poorly drained soil type, exhibits a poor horizon development, a black A₁ and extreme mottling in the B horizon. It is found in depressional areas of the Rolling Plain and for satisfactory use requires artificial drainage. Only 52 per cent of the cleared land is cultivated and spring grain and hay make up only 37 per cent of the cleared land. Pasture, the major use, occupies 45 per cent of the cleared portion of this soil.

(e) The Cashel Catena

The Cashel Catena is found chiefly in the shallow clay plain. Its well-drained member, Cashel clay loam, has a six-inch A₁ horizon of very dark grayish-brown clay loam over well-developed stone-free A₂ and B horizons. Gray-brown till is found at depths of three feet. On slopes there is some erosion of this soil type. Only 79 per cent of the cleared area is cultivated but a fairly large area (7 per cent of total) is in intertilled crops such as tomatoes. Spring grain and hay make up 52 per cent of the area.

A slightly deeper and darker A₁ and a mottled A₂ and B indicate Peel clay, the imperfectly drained member of the catena. The surface is predominantly smooth so that erosion is not a serious problem, but tile drainage is necessary in many areas. Eighty-four per cent of the cleared area is cultivated and 54 per cent is in spring grain and hay. Like Cashel, Peel has an unusually large area in intertilled crops.

Malton clay shows an eight-inch A₁ horizon of very dark gray clay over poorly defined and extremely mottled A₂ and B horizons. It is found in depressional areas and must be drained for use. Sixty-eight per cent of the cleared area is cultivated with only 40 per cent in spring grain and hay, but 7 per cent is in intertilled crops.

(f) Bottomland

Bottomland designates depositional material along the streams which has not yet completed the processes of

soil formation. Much of it is imperfectly and poorly drained. It is used chiefly for pasture, which covers 73 per cent of the cleared area.

CHAPTER 4

LAND USE

1. Types of Farming, Crops, Rotation

(a) Types of Farming

The two valleys are in an area of mixed farming which has been strongly influenced by the nearness of Metropolitan Toronto. Some of the farms are extremely large; the balance are average for Ontario. The smaller operators carry on general farming and sell some milk, eggs, hogs, cattle and tomatoes or potatoes. Some may gain revenue chiefly from the sale of milk while others are mainly interested in raising beef cattle. These farmers divide their cultivated land roughly into 38 per cent spring grain, 31 per cent hay, 16 per cent winter grain, 6 per cent intertilled crops and the rest in fallow and other uses. This distribution seems to indicate a three-year rotation of hay, spring grain, winter grain, fallow or intertilled crops.

Superimposed on this system of small farms are the large landowners from the city who possess ample funds and are able to try new methods of farming on a large scale. One of these has located in the Little Rouge Creek Valley where he raises Hereford cattle. The predominant land uses on this establishment are pasture, hay and spring grain.

Another effect of Metropolitan Toronto is the building of houses on lots along the roads. These lots are sold by the farmers to people wanting the advantages of country living along with jobs in the city.

2. The Importance of a Study of Land Use

It may be said that there is not much point in mapping and recording the present land use of an area because it will all be changed in succeeding years. However, most farm operators recognize limitations of slope, erosibility, texture and fertility. Thus, if an operator has level land and steep land he will not normally put intertilled crops on the slope while he grows hay on the level land. The present land use

picture shows, for a small valley, the types of crop most farmers favour for a certain soil type with a given slope. This reflects either one or both of two things: an adaptation of crop to land capability, or an adaptation of crop to the prevailing economic system. The latter may or may not be in harmony with the land. If it is not, soil problems may become many and acute. From the results of a present land use survey a land use capability rating may be drawn up to fit the area. For instance, if a soil type with a certain slope and erosion is used by a majority of operators for 50 per cent hay, 25 per cent spring grain and 25 per cent winter grain then the recommended use for that particular type of soil would be a four-year rotation with two years in hay and two in grain.

Of course, when an operator's best land is worse than another operator's worst land, there can be a too intensive use of poor land in one case and not intensive enough use of good land in the other. However, cases like this are rare and on many farms a slight rearrangement of land use may benefit both soil and water. The amount of erosion resulting from the cultivation of the major crops increases in the following order: hay, winter grain, spring grain, fallow, intertilled crops.

3. Present Land Use

The following table summarizes the use of the land in the two valleys in the crop season of 1954.

From the figures it may be seen that on the average there is a three-year rotation with one year hay, one year spring grain, one year either winter grain, fallow or intertilled crops, with the frequency of winter grain twice every 12 years and intertilled crops and fallow once every 12 years each.

This short rotation is sufficient for the level land of the valleys but a longer-term rotation with more soil-building and erosion-preventing crops is necessary on the steeper slopes.

PRESENT LAND USE ON LITTLE ROUGE AND CLAREMONT CREEK VALLEYS

Use	Little Rouge Creek		Claremont Creek		Total	
	Acres	%	Acres	%	Acres	%
Intertilled Crops (mostly tomatoes and potatoes)	872	4.1	178	2.9	1,050	3.8
Fallow	1,236	5.8	176	2.8	1,412	5.2
Spring Grain	5,646	26.5	1,191	19.4	6,837	24.9
Winter Grain (wheat)	2,545	12.0	396	6.4	2,941	10.7
Hay	4,547	21.3	1,119	18.3	5,666	20.6
Pasture	3,804	17.8	1,885	30.7	5,689	20.7
Woodland	1,660	7.8	763	12.4	2,423	8.8
Built-up areas	659	3.1	299	4.6	958	3.5
Idle	140	.7	140	2.2	280	1.0
Other	209	.9	17	.3	226	.8
Total	21,318	100.0	6,164	100.0	27,482	100.0

CHAPTER 5

CONSERVATION PRACTICES

1. Soil Conservation

Soil conservation is the best use of the land for the greatest advantage of all of the people on the land for all time.

Intensive use of low-capability land will deplete its fertility and increase the danger of erosion. At the same time less intensive use of high-capability land is wasteful, though sometimes necessary.

2. Soil Fertility and Organic Content

Organic content of the soil is important because it increases the ability to hold water and because it makes the soil better able to hold and release mineral nutrients for plant use.

High fertility levels not only give greater crop return for the same amount of effort but indirectly improve or maintain the organic content because, with higher yields of crops, more residue is returned to the soil.

3. Erosion

When water or wind removes some of the soil it is called erosion. Before cultivation exposed the soil by removing the vegetation, wind erosion was rare and water erosion only slight. The soil-building processes merely developed deeper to make up for what had been lost. Since the soil has been cultivated the rate of erosion has been speeded up. It is this accelerated erosion which is referred to as "erosion" in soil conservation.

The question of erosion is always connected with that of water loss. If water penetrates the soil it cannot run overland and erode soil on slopes, or conversely, if erosion is checked there will be more penetration of water into the soil.

The holding of water is just as important as holding the soil. Control of run-off means control of erosion; one necessarily involves the other. Erosion-exposed parent material can sometimes be successfully cropped. But it nearly always is much poorer and often is practically worthless for some crops.

The susceptibility of a soil to erosion is dependent upon a combination of factors. Not only is the amount of run-off important but also its velocity. The latter depends upon both the nature of the slope and the vegetative cover protecting the soil.

Soil bared by cultivation is exposed to the maximum effort of eroding water. Intertilled crops such as corn provide very little protection. Drilled crops, such as the grains, impede run-off to a slightly greater extent. Almost complete protection is afforded only by a permanent sod or tree cover. Grass, in most cases, appears to be as effective as trees in holding soil. The average results of a thousand measurements in the United States show that under the exposure of clean tillage and fallow, soil is lost at a rate nearly 100 times as rapidly as from corresponding areas safeguarded with a dense cover of vegetation, and that nearly seven times as much of the rainfall is lost as run-off from cultivated land as from land protected with vegetation. Observations made in Ontario at Ottawa and New Hamburg confirm these conclusions.

Obviously the greater the slope, the greater will be the run-off and erosion. The length of the slope is also important. Long smooth slopes are more susceptible to soil wash than are short hummocky ones.

There are several soil characteristics that influence the ease with which water can penetrate a soil. Coarse sandy and gravelly materials are extremely pervious to water and, if all other factors are constant, will not wash or gully as seriously as will a heavy clay. Sands, however, are more subject to wind erosion. The higher the organic content

of a soil, the greater the downward percolation of water. If the friable organic topsoil is lost a heavy B horizon with a high clay content may be exposed at the surface. Tillage is rendered more difficult and water penetration is impeded. At the same time the loss of organic matter and consequent water-holding capacity increases the hazard of drought.

The part played by groundhogs in erosion should not be overlooked. In addition to impeding the use of implements with their burrows and mounds, they bring loose earth to the surface where it is subject to wind and water erosion. The destruction of vegetative cover around the burrow facilitates soil wash. The burrow may also provide the starting point in the development of a gully.

The soil in this area has now been exposed by cultivation for about a century. Only a small percentage has, as yet, undergone really severe erosion. Considerable wash has taken place on all sloping land, however. Looking to the future, one realizes on the basis of past experience that, unless adequate protection is provided, within the next 100 years a large part of the valuable agricultural land is going to be very seriously impoverished by this insidious process.

4. Estimating Erosion

The most obvious evidence of erosion is in gullies. These, however, represent the most advanced stage and it is obvious that a great deal of sheet erosion (soil wash) must have occurred before the gullies formed. Small gullies, or rills, are easy to see in the spring or during heavy summer storms in fallow fields or on slopes sown to intertilled crops. Because they are obscured by tillage implements the rills tend to be forgotten. They are, nevertheless, certain evidence that erosion is taking place.

The effect of erosion is clearly seen in the poor crop response, due to drought, on eroded spots on knolls or on the sides of hills. If severe soil wash has taken place,

Profile of imperfectly drained Milliken loam. The dark band of the B horizon is clearly seen, with the lighter coloured A₁ above it and the parent material below. This profile illustrates the depth of soil that may be removed when erosion is into the parent material.



Even almost level land may be subject to water wash.



Cultivation up and down the slope and unprotected waterways can lead to serious soil erosion and unproductive land

patches of gray C horizon may be exposed at the surface. When ploughed, patches of this lighter-coloured grayish material will be visible on the steeper slopes. In areas where this is seen other superficial evidences are usually available. These include the piling up of sediment at the bottom of a hill, accumulation of soil on the uphill side of a fencerow and cutting away of soil on the downhill side.

To get a more certain determination of erosion the soil profile must be examined. In an area of one type of soil it is possible to get a fair sample of the soil in old woodlots or along old fence lines. The horizons of an undisturbed profile can thus be examined. Such a profile, for instance, may exhibit one foot of topsoil (A1 and A2) and two feet of subsoil. On an adjacent cultivated slope on which erosion is suspected, subsoil may be recognized under 6 inches of A horizon. It is safe to assume that something like 6 inches of topsoil have been eroded away. In a more serious case one might find the subsoil exposed at the surface, and the C horizon or parent material at a depth of only 12 inches. All of the topsoil and one-half of the sub-soil have been eroded.

If the recognition of horizons by colour or texture is difficult, a simple chemical test can be used. It has been shown that there are, characteristically, no free lime carbonates in the topsoil or subsoil but that they exist in the parent material. A dilute solution of hydrochloric acid gives effervescence with lime carbonate. In an undisturbed profile it may be possible to get a fizz at three feet, but on an eroded site at two feet. It is then estimated that one foot of the original soil has been eroded away. If the surface soil is a grayish colour and effervesces with acid, all topsoil and subsoil have been removed.

5. Crop Rotations and Cover Crops

A crop rotation means following a regular sequence of crops on a field with the same sequence repeated every three or more years. Cover crops are those crops which are planted mainly for the purpose of protecting or rebuilding the soil.

The need for building up soil, keeping fields clean, adding nitrogen and making the best use of soil nutrients is fairly well understood and these measures are commonly practised.

This system of farming has two advantages: one is directly related to yields and quality, the other advantage is related to building and protecting the soil. Repeating certain crop and tillage practices rapidly depletes the soil nutrients, destroys its tilth, reduces organic content and exposes it to erosion.

The advantages of a rotation system include: the drawing of plant nutrients from different levels, the use of deep-rooted crops to bring up nutrients from lower levels, addition of fibre by ploughing-under crop waste, and improvement of tilth by alternative systems of tillage.

In this report, in which conservation is being stressed, the value of crop rotations and cover crops depends on their ability to rebuild the soil, protect it from erosion, maintain organic matter, add nitrogen and keep the soil in good tilth. The soil is required not only to provide a good medium for the roots of plants and a generous supply of nutrients, but should be the best possible medium for absorbing and retaining moisture.

Crop rotations and cover crops, therefore, become one of the most important tools of the conservationist. Crops may be classed as soil-building (the grasses and the legumes) and soil-depleting (grain, corn and root crops). Of the latter the intertilled or hoe crops, corn, beans and roots,

exhaust the soil most rapidly and expose it the most to erosion and drought. The conservation farm planner arranges the cropping systems field by field, so that the land of lower capability, subject to erosion, has more of the soil-building and less of the soil-consuming crops. Land subject to serious erosion has the hoe crops excluded from it almost entirely.

To get the greatest advantage of this system, the farm must be carefully planned, so that the land of highest capability is able to carry the necessary amount of grain, corn and roots. Wise use of the best land is, therefore, an important feature of conservation.

In extending a rotation from, say, three years to five years, so that there are three years of soil-building crops and only two years of grain or corn, the proportion of grain or corn on the farm may be much lower. The yields, however, may be higher per acre because the soil is in better condition.

Extended rotations and the use of cover crops such as winter rye, following summer ploughing, keep the soil under a protective covering throughout that time of the year in which erosion is most serious.

6. Improved Pasture

A long-term improved pasture is one which is seeded to grasses and legumes and left for five years or more. It may be renewed by reseeding with or without the use of a nurse crop such as oats. Actual production of field crops is eliminated or kept to a minimum. Thus, the soil is kept under protective cover at all times and is carrying soil-building crops, namely grasses and legumes.

Too much stress cannot be put on the use of good pasture. In both beef and milk production, the grass of the field is the basis of the largest part of production. The carrying capacity in animals per acre or the yields, in tons of

forage, pounds of meat, or gallons of milk, can be increased very considerably over what is commonly accepted as ordinary pasture. Pasture should never be considered as merely a lesser use of land but should be considered as a crop which gives generous returns for the capital and labour put into it. The improvement of pastures for the sake of higher production is being carried out, in many instances, strictly for economic reasons - chiefly the shortage of labour.

There is no need to dwell on this aspect of pasture in a report on conservation, but the importance of pasture to control erosion and to improve the moisture relations is overlooked and needs to be stressed here. Grasses and legumes rebuild the organic matter in the soil, protect it almost completely against erosion, and do as much as any other measure in making the rainfall go into the soil so that it is protected from drought. Ground-water levels of water are thus maintained to the advantage of springs and streams.

Specific recommendations for the preparation and seeding of pastures can be obtained from bulletins distributed by the Department of Agriculture. Soil tests and application of fertilizer are just as important as they are for any field crop or cash crop. A point which has been overlooked has been the use of improved pastures on land of lower capability. They may give as good a return in grazing as the best fields and the best land and, at the same time, protect the soil.

Management of pasture after seeding and in the years before it is renovated is extremely important, not only to maintain production but to get the best return from the initial expense in working, seeding and applying fertilizer.

Repeated clipping of pastures is an important feature of pasture management because it keeps the turf thick to give protection to the soil, keeps down weeds and maintains the grass in the most palatable and nutritious condition.

Another feature of pasture management is applying fertilizer. This may be in the form of a dressing of manure or

the application of a commercial fertilizer, particularly those high in phosphates. Occasionally raking a pasture to spread out the animal droppings makes the pasture more agreeable to the animals and makes the best use of their droppings for fertilizer.

Where possible, it is an advantage to rotate the herd in a pasture so that a few acres are grazed intensively while other acres are recovering their growth. This may be done by using electric fencing, and about the only limit to this practice is the availability of water for the stock. With respect to the watering and the location of salt licks, they should be arranged, particularly in hilly country, so that cattle do not follow the same path regularly, for such paths can soon turn into gullies.

In good pasture management, the animals are not left out to the very last thing in the fall. If the grass is allowed to grow a bit before frost comes, the soil is better protected during the winter and the grass gets off to a better start in the spring. Grazing thus sacrificed late in the year can be made up for by browsing on winter grain or by use of silage or other fodder.

7. Contour Cultivation and Strip-Cropping

Strip-cropping on the contour consists of laying out row crops (grain, corn and roots) with alternate strips of close-growing crops (grass and legumes), with all strips laid out at right angles to the slope, or "on the level". Contour cultivation is a simplified method in which a field may be sown to one crop, but cultivation is all done around the hill rather than up and down the slope.

Soil wash, rills and gullies show obvious evidence of soil erosion. Wheel tracks, furrows and drill rows tend to concentrate overland flow of water. Not only is valuable topsoil lost and the field scarred by gullies, but rainfall which might have replenished soil moisture and recharged



Slopes such as this are easily cultivated on the contour. Contour cultivation on land suited to it helps reduce erosion and water run-off, promotes greater yields and saves time and fuel.



On land like this, cultivation on the contour may be impractical. Extended rotations will aid in the elimination of soil loss and provide the humus the soil requires.

ground-water levels is lost. The eroded soil is less able to absorb moisture and the results are seen in drought and lower yields.

Each furrow on the contour acts as a little dam. Water is induced to go into the land and leave the soil in place. There are no erosion scars to be worked over and the soil keeps its tilth, its moisture and its productivity.

Where there are strips of grassland alternating with fallow, drilled or hoe crops, a further check is provided. If any soil or water is washed from exposed soil it is trapped by the grass on the sod strip. The soil under the sod does not become sealed and compacted by the impact of rain, and moisture can go into the soil more easily.

The increased yields, measured in dollars and cents, due to more moisture, better soil and greater fertility, are not the only benefits of this kind of farming. Ease of operation and lower fuel costs for power make it a worthwhile system. Yields have been proven to increase 10 per cent, all other things being equal, by contour cultivation, due mainly to better use of moisture. Fuel costs in tests have shown 17 per cent savings in working on the contour.

8. Terraces

Terraces are broad, shallow ditches running across a slope with side grades gentle enough to allow implements to work over them. They may be cultivated or left in grass. Their purpose is to break a long or steep slope so that overland flow of water down the slope is checked, forced to penetrate the ground, and the surplus is diverted at lower speed across the slope. They have a slight downhill gradient, just enough to carry the water away. They empty surface water into a watercourse or structure in which it can be carried safely away.

Terraces prevent serious erosion on lower slopes where water otherwise attains great velocity and erosive power.

They get more water into the ground. Terraces deliver heavy flows of water harmlessly to natural waterways.

Terraces may be combined with contour strips and tillage or may stand on their own. Once a long slope has been divided into two short ones by means of a terrace, there may be no need to carry out other intensive practices of contouring.

Some broad-based terraces for diverting run-off have been built in Ontario, using special equipment such as a road scraper or an implement called a Whirlwind Terracer. A few demonstrations of terraces should be arranged by the Authority, using these methods. Actually, they can be constructed with a farmer's own equipment, such as tractors and ploughs or disc tillers. Once a few farmers in a district have learned the technique of making them, and any good ploughman can do so, all that is necessary is a little technical assistance in laying them out with a level and some consideration of the amount of water they may be expected to carry.

Once established, terraces must be checked for faults or failures and must be properly maintained. Pronounced low spots should be filled in and the flow of water kept uniform. Cultivation is on the contour. Any sediment that collects in the trough is turned upwards to the rim by ploughing.

Before terraces are constructed, a safe outlet must be provided. In many cases this will be a permanently grassed waterway. Meadowland or woodlots which resist erosion can be useful discharge places for surplus water.

9. Grassed Waterways

A grassed waterway may be a natural intermittent watercourse which is left in sod or seeded to grass, or may be specially graded to receive overflow and seeded to grass.

The simplest grassed waterway is established by tripping implements as they cross the sod on a watercourse

when the hay or pasture in a field is being disced or ploughed under.

A grassed waterway may be established by grading or filling in a gully. If this is done, care must be taken to prepare a good seed bed by thorough cultivation, fertilizing and packing.

The grasses used should be those which form a thick mat and will lie flat under running water. Kentucky blue grass is successful on rich soils. Timothy is adaptable to a wide range of soil conditions, but is a bunch grass and must be used with other grasses such as red top. Brome grass with its deep roots is suitable for deep, fertile soils. Reed canary grass will grow in poorly drained soils as in a deep, well defined waterway, but should not be used on well-drained soils because its dense growth collects soil and dams up the water.

It is important in establishing grass waterways to get a good dense sod as soon as possible. If this cannot be done, a cover crop, sudan grass, oats or rye, may be seeded to give protection until a more permanent turf is established. In some cases it may be necessary to protect the soil with a mulch of straw manure, straw or wood chips.

Grassed waterways stop erosion, make better use of water and ensure delivery of clear water into the streams. A further advantage is that they may produce a good stand of hay year after year. For this purpose, it is wise to have gentle slopes which can be worked, and a width sufficient to allow a mower to go down and up the waterway.

10. Gully Control

Gully control may be achieved by vegetative or mechanical methods or a combination of both. They hinder cultivation of the land, allow water to run off rapidly, and their formation often is the cause of silting of good fields lower down.

There are three ways in which a gully may be controlled:

First, by a series of check dams. These make the water walk instead of run. Gullies serious enough for this treatment are not common on the R.D.H.P. Watersheds.

The second method is by diverting the water to some other channel by means of a dike, terrace or ditch. By this method water is diverted from the head of the gully before it reaches it, and is carried off on a gentle gradient for safe delivery elsewhere. When so treated a gully may be filled and cultivation allowed across it. This method may be worked into the farm plan, along with contour cultivation, terraces and grassed waterways.

The third method is to conduct the water safely down a channel and spread it out so that it does not attain erosive velocities. In small gullies, the sides may be ploughed in and the channel shaped and treated as a grassed waterway. For small gullies, this is the most effective and least expensive of the three methods. More serious gullies may call for a combination of all three.

Gullies cannot be controlled by filling them with garbage, old machinery and other trash. These create an eyesore on the farm and the erosion still continues underneath the pile of debris.

11. Drainage

Artificial drainage is the removal of the surplus water on the surface or within the soil to root depth and its redistribution to a channel where it does not interfere with top growth. This is the most widely practised conservation measure at the present time. It has two advantages: it makes soils of high inherent fertility capable of carrying the full range of crops that are carried on the well-drained soils of the region. It has a further advantage of creating storage

capacity for moisture within the soil. A water-logged soil cannot store excess precipitation either of a heavy rain or of the spring thaw. Open drains are effective for the removal of surface water and as outlets for tile. Any problems connected with drainage are largely those of ditch maintenance. A ditch built with gentle slopes and well spread spoil banks may be a little more expensive to build, but the cost of maintenance is much lower and it remains effective for a longer time. Gentle banks with slopes as low as one in three do not slump in or erode as badly as steep slopes. Vegetation which may plug a ditch can be controlled in a gentle slope by using a mower. The bank and spoil, if they are smoothed out, can be made useful for hay, rather than wasted land if they are left rough.

Under-drainage by tile is, as was noted above, beneficial in two ways: tile at depths of two to four feet creates storage capacity for water in the soil and allows the penetration of roots to those depths into the warm, open soil. Some tile systems may be inadequate, but rather than add tile more closely spaced, much can be done to improve the natural drainage of the soil by using deep-rooted crops which improve the structure of the soil and allow the water to move through it.

Strangely enough, poorly drained soils can become seriously subject to drought. Crops in the early wet part of the season cannot root deeply. In the hot, dry season, moisture does not move readily upwards in the characteristically massive, poorly drained soils and the shallow-rooted crops suffer from drought.

The faults found in a tile drainage system are usually associated with inadequate or poorly constructed outlets. To provide good outlets, the last few feet of drain should be of vitrified tile or corrugated metal pipe extended a few feet out into the ditch or stream. A head wall will prevent cutting back and an apron will prevent scouring and erosion of a gully by the

water issuing from the outlet. Surface water should not be allowed to concentrate and discharge over the tile as this will cause a gully. A simple hinged gate permeable to water should hang over the outlet to exclude animals which may otherwise climb up the tile and plug it.

There is some land on the watershed which is poorly drained and on which it would not be economical or possible, for one reason or another, to establish drainage. The best use of this land can be made by establishing hay and pasture mixtures of species tolerant of wet conditions. Reed canary grass is one such grass. Thus, poorly drained areas now covered only by willow scrub and sedges, which offer a refuge for cattle during the drought season but which produce very little, may be made to yield a good production. Grasses tolerant of very wet conditions, which can compete successfully with sedges, are usually quite succulent but tend to grow rank, coarse and unpalatable. To keep them in good condition for use later in the season, they need to be clipped to keep the growth firm, succulent and palatable for the cattle when they need this grazing. Thus, these lands can be used to good advantage to relieve the pastures on the better drained lands of overgrazing during the dry season and better use is being made of the moisture which is stored in these wet locations.

12. Farm Ponds

Small swampy or springy areas on farms which constitute water-storage areas should be protected and shaded by trees. To make use of the water for stock watering, ponds, properly constructed, will give ample use of water and preserve natural storage. Indeed, some old springs which are now merely areas of seepage might be restored by tree-planting and protecting the moist area from cattle or soil wash from eroded slopes.

Farm ponds are a useful conservation practice. The water stored in a farm pond will provide water for livestock,



A pleasing example of a small pond, in this case one of the by-pass type. Ponds like this, with the spoil graded back, and properly fenced, can provide recreational and stock-watering facilities and, depending on the location, fire protection.

fire protection, orchard spraying, garden or field irrigation, fish production, recreation and a breeding place for wildlife.

Farm ponds should be properly planned and constructed if they are to fill their intended purpose and certain basic principles of design and construction must be followed. A descriptive bulletin on farm ponds is available from the R.D.H.P. Conservation Authority.

13. The Run-Off Cycle

The run-off cycle is the cycle of water movement from evaporation, through water vapour in the air and precipitation, to run-off and ground water. When precipitation falls there are two destinations for the water. It may run off the surface or it may percolate through the soil to the ground water. Eventually, of course, the water reaches a stream either way. If the water runs off the surface it runs off only during the precipitation. Thus, the soil is eroded and saturated during rains and dried out during dry periods. If the water percolates down through the soil to the ground water it is held in the soil and let out slowly to streams, causing them to have a more even flow. At the same time, the water in the soil is available for plants.

14. Summary

All of the above-mentioned conservation measures except drainage and farm ponds are important in that they hinder surface run-off and promote percolation of water into the soil. The increase of moisture in the soil aids plant growth through dry periods and makes plant nutrients available to plants in the only form in which plants can use them, in solution. An increase in plant growth increases the amount of organic material available to the soil. In turn, the organic material acts as a sponge to hold more water and thus prevents run-off.

Drainage increases the ability of imperfectly drained soils to hold water and thus decreases the amount of run-off. Ponds, on the other hand, store water that has found its way into streams and they help raise the ground water table.

CHAPTER 6

LAND USE CAPABILITY

1. The Land Use Capability Classification

To plan the use of land for a soil and water conservation program, it is necessary first to classify it in terms of its use capability. The system of classification which has been used here was devised by the Soil Conservation Service of the United States Department of Agriculture. This same system has been adopted by the Soil Advisory Service of the Soils Department of the Ontario Agricultural College in laying out plans for conservation farming on individual farms.

"River Valley Development is the wise use of all the natural resources of a river valley for all the people living in that valley for all time". With respect to the soil and agricultural use this means adopting crops and tillage methods which will get the most out of the soil without destroying its fertility, its ability to absorb and hold moisture, or allowing it to erode.

The capability of the soil is rated in three main groups as follows:

- A - Suitable for Cultivation
- B - Suitable only for Occasional Cultivation
- C - Suitable only for Permanent Vegetation

The features which downgrade the soil are low inherent fertility or droughtiness, slope and susceptibility to erosion and water loss, inadequate drainage, and boulderiness and rough topography which limit the use of tillage implements. These were observed in the sample area mentioned in a previous chapter.

The three main groups are divided as follows:

A - Suitable for Cultivation

- Class I - Without any special practices over and above good farming
- Class II - With moderate restrictions in use or simple practices

Class III - With severe restrictions in use
or intensive practices

B - Suitable Only for Occasional Cultivation

Class IV - With limited use and intensive practices

C - Suitable Only for Permanent Vegetation

Class V - With no special restrictions or
special practices

Class VI - With some restrictions in use or
special practices

Class VII - With severe restrictions in use
or special practices

2. Recommended Land Use Classes according to Use Capability

The land use capability classes may be converted into classes of recommended use by indicating which special practices and restrictions are required to adapt the use of the land to its capability. The recommended classes are indicated by adding the symbols C, R or D to capability classes II and III, and T or P to Class IV.

The recommended Class C applies to land whose capability is reduced by erosion (or susceptibility to erosion) which can be corrected by mechanical means, that is, contour tillage, diversion terraces, strip-cropping, buffer strips and the like. (Contour tillage is the most easily recognized, and hence the use of the letter C to designate this type.)

Land subject to erosion, drought or fertility depletion which calls for vegetative methods of control or restrictions in use is indicated by the letter R. Wet land whose productivity can be improved by artificial drainage is indicated by the letter D. Class II D requires simple practices such as field drains and III D requires tile drainage or, if left in its natural state, is seriously restricted in its use.

Class IV land which is too rough or eroded to be put under regular rotation is indicated as IV T. Land which is too wet for regular rotations and on which artificial drainage is not feasible is indicated as IV P.

Land Class II R requires watercourse management and, usually, longer rotations.



Topographically similar to Class I land. Class II D land requires improved drainage to make it more productive



On Class III land sheet wash may become serious and result in unproductive land. The incorporation of organic material, the use of extended rotations and elimination of hoe crops can help prevent this sort of thing

3. Land Use Classes

(a) Land Class I

This class is found only on the Little Rouge Creek where it comprises about 14 per cent of the valley. It occurs chiefly on Woburn loam or Cashel clay in the Shallow Clay Plain where slopes are between 0 and 2 per cent and there is little or no erosion. It may be freely cultivated in any regular rotation with no special practices over and above what is now understood in the area to be good farming.

(b) Land Class II C

Woburn loam and King clay loam are the principal soils on which this class is found. The smooth flanks of the whale-back hills of the Rolling Plain are ideal for conservation practices which require long smooth slopes of from 2 to 6 per cent. Only 3.8 per cent of Little Rouge Creek and 4.3 per cent of Claremont Creek are in this class. Contour cultivation, strip-cropping and diversion terraces are recommended for these slopes.

(c) Land Class II R

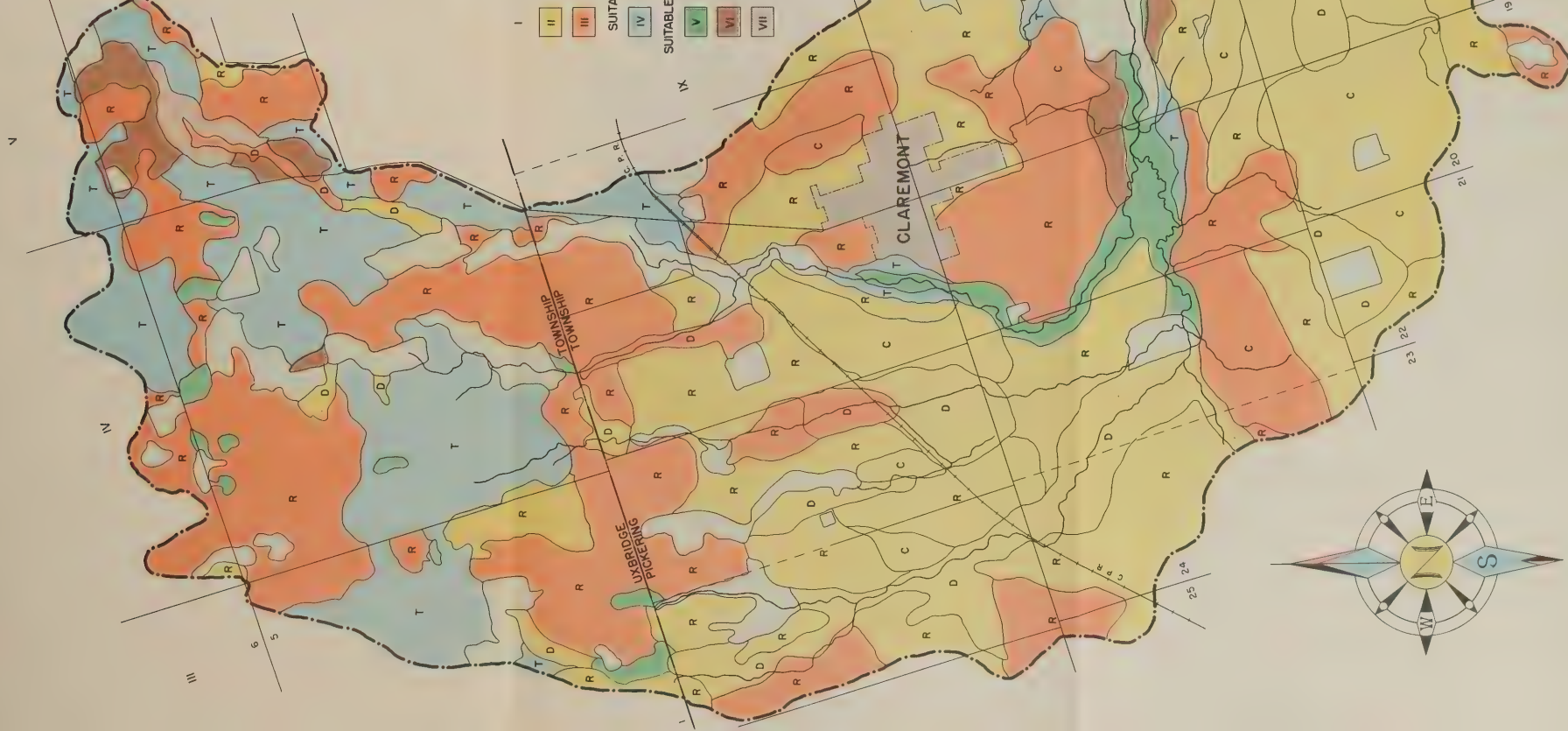
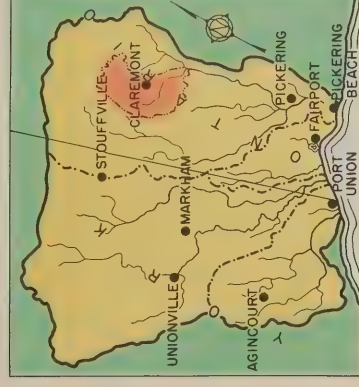
Thirty per cent of Little Rouge Creek and 31 per cent of Claremont Creek are in the II R land. This is hummocky land with slopes ranging from 2 to 7 per cent and is unsuitable for contour cultivation. Woburn loam and King clay loam are the chief soils in this class, but gently sloping Pontypool and Brighton suffering from low inherent fertility have also been included. Extended rotations, winter cover crops and restrictions on intertilled crops on the steeper slopes are the practices recommended for this class.

(d) Land Class II D

Most level, imperfectly drained land and a little poorly drained land have been classed as II D land. The principal soils are Peel and Milliken. Simple methods of field drainage are necessary. The greater flatness of the Little Rouge Creek is shown by the fact that this class covers 27 per cent of this valley and only 7.6 per cent of Claremont Creek.

ROUGE, DUFFIN, HIGHLAND AND PETTICOAT WATERSHEDS

CLAREMONT CREEK VALLEY RECOMMENDED LAND USE ACCORDING TO USE CAPABILITY



USE CAPABILITY CLASSES

SUITABLE FOR CULTIVATION

(No class I land mapped)

II WITH SIMPLE PRACTICES

III WITH INTENSIVE PRACTICES

SUITABLE FOR LIMITED CULTIVATION

IV WITH SOME SPECIAL PRACTICES

SUITABLE ONLY FOR PERMANENT VEGETATION

V WITH SOME SPECIAL PRACTICES

VI WITH MODERATE RESTRICTIONS

VII WITH SEVERE RESTRICTIONS

RECOMMENDED MANAGEMENT

C LAND REQUIRING EROSION CONTROL BY CONTOUR TILLAGE METHODS

D LAND REQUIRING ARTIFICIAL DRAINAGE

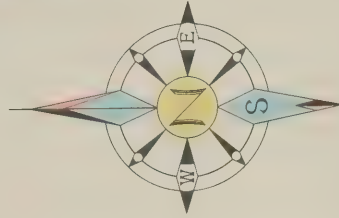
R LAND REQUIRING RESTRICTIONS IN USE (These apply only to classes II and III)

T RESTRICTED USE DUE TO ROUGH TOPOGRAPHY

P RESTRICTED USE DUE TO INADEQUATE DRAINAGE (These apply only to class IV)

LAND UNDER EXISTING FOREST COVER

SCALE 0 1/8 1/4 1/2 3/4 MILES



(e) Land Class III C

With slightly steeper slopes than II C but on the same soils, this class requires intensive control measures such as contour tillage, strip-cropping, diversion terraces and grassed waterways. Only 2.0 per cent of Little Rouge and 2.4 per cent of Claremont are in this type.

(f) Land Class III R

This land type is found on moderately eroded Brighton, Pontypool and Woburn in the Oak Ridges area. The topography is hummocky and slopes range from 7 to 15 per cent. Twenty per cent of the land in the Claremont Creek is in III R as compared to 4.4 per cent for the Little Rouge.

Intensive vegetative conservation measures are suggested. These measures include long-term rotations with 3 or 4 years of soil-building grasses and legumes and one year in corn, roots or, preferably, grain. Winter cover crops should be grown on exposed slopes.

(g) Land Class III D

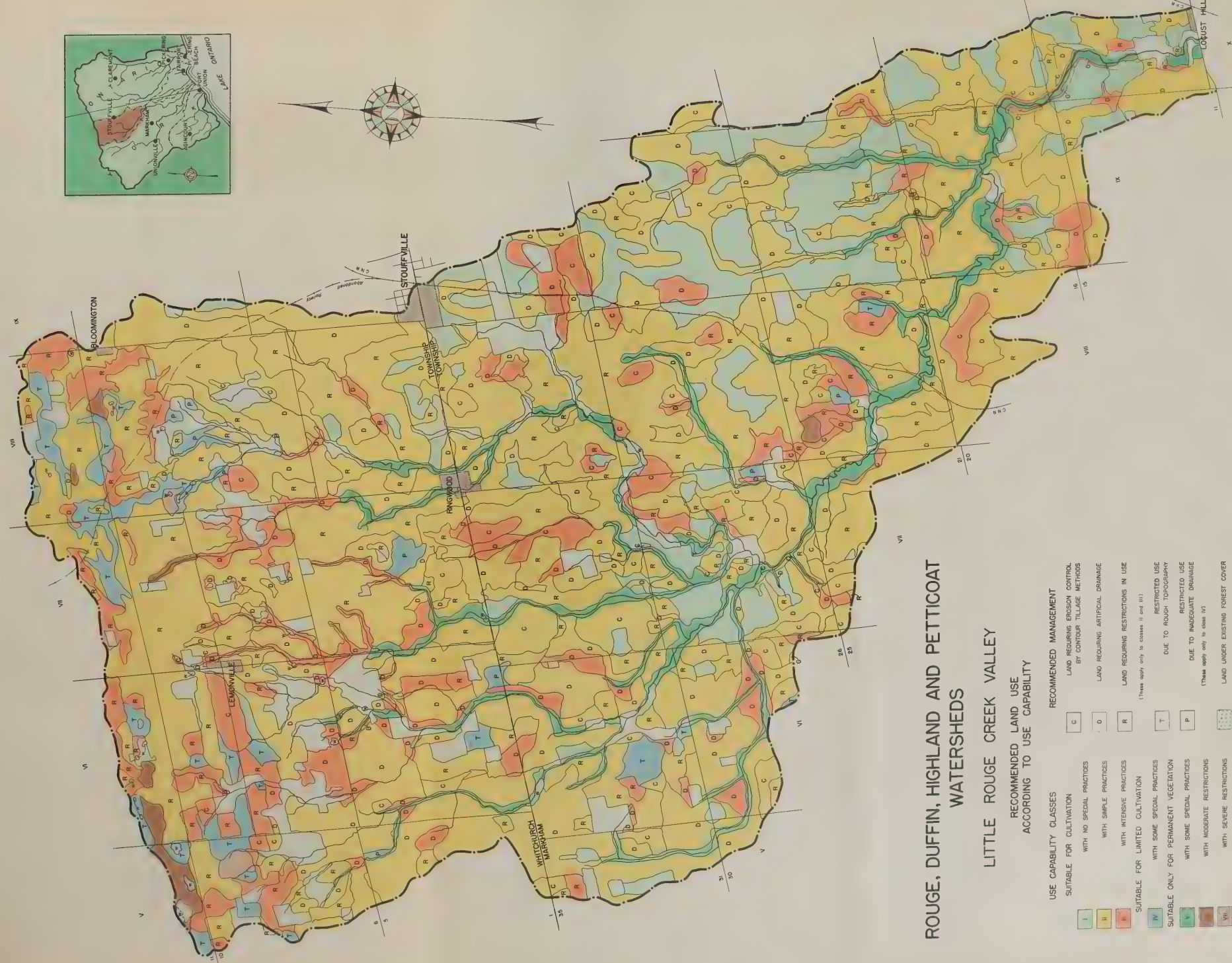
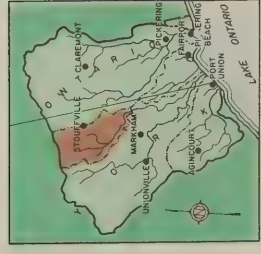
Malton and Lyons soil types are the location of this class which makes up 4.7 per cent of Little Rouge and 8 per cent of Claremont. In this class outlets are available for drainage but the cost would be high.

(h) Land Class IV T

Smooth slopes of over 10 per cent and all slopes of more than 15 per cent should be sown to permanent pasture with reseedling being the only time at which the sod should be broken. Class IV T covers 2.2 per cent of Little Rouge and 13.6 per cent of Claremont Creek.

(i) Land Class IV P

This type comprises only .5 per cent of Little Rouge and .3 per cent of Claremont Creek and occurs on the very poorly drained soils of the Woburn, King and Cashel catenas. It is suitable only for permanent pasture.

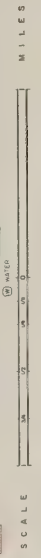


ROUGE, DUFFIN, HIGHLAND AND PETTICOAT WATERSHEDS

LITTLE ROUGE CREEK VALLEY

RECOMMENDED LAND USE ACCORDING TO USE CAPABILITY

USE CAPABILITY CLASSES		RECOMMENDED MANAGEMENT	
I II III IV V VI	SUITABLE FOR CULTIVATION	C	LAND REQUIRING EROSION CONTROL BY CONTOUR TILLAGE METHODS
	WITH NO SPECIAL PRACTICES	D	LAND REQUIRING ARTIFICIAL DRAINAGE
	WITH SIMPLE PRACTICES	R	LAND REQUIRING RESTRICTIONS IN USE
VII VIII IX X XI XII	SUITABLE FOR LIMITED CULTIVATION	T	RESTRICTED USE DUE TO ROUGH TOPOGRAPHY
	WITH SOME SPECIAL PRACTICES	P	RESTRICTED USE DUE TO INADEQUATE DRAINAGE
XIII XIV XV XVI	SUITABLE ONLY FOR PERMANENT VEGETATION		(These apply only to classes II and III)
	WITH SOME SPECIAL PRACTICES		(These apply only to class IV)
XVII XVIII XIX XX	WITH MODERATE RESTRICTIONS		LAND UNDER EXISTING FOREST COVER
	WITH SEVERE RESTRICTIONS		



(j) Land Class V

Land Class V is confined to the flat floors of river valleys and is imperfectly or poorly drained. Much of this land is at present in forest or pasture and should be kept in those uses with no special practice. Little Rouge Creek has 3.8 per cent of its cleared area in this type while Claremont has only 2.8 per cent.

(k) Land Class VI and VII

These classes are of increasing steepness and erosion and should be kept in permanent vegetation at all times. About 1 per cent of the cleared part of Little Rouge Creek is in these types, compared to 2.4 per cent of the cleared portion of Claremont.

4. Recommended Land Classes Compared to Present Use

PROPORTION OF RECOMMENDED LAND USE CLASSES
IN THE TWO VALLEYS

(Wooded and Built-Up Areas Excluded)

Class	Percentage of Total Acreage			
	Little Rouge Creek		Claremont Creek	
I	11.7			
II C R D	61.3	3.8 30.4 27.1	42.8	4.3 30.9 7.6
III C R D	11.1	2.0 4.4 4.7	23.3	2.4 20.1 .8
IV P T	2.7	.5 2.2	13.9	.3 13.6
V	3.8		2.8	
VI	.8		1.6	
VII	.1		.8	
Forest	7.8		12.1	
Other	.7		2.7	

Class V land is subject to periodic flooding and normally best suited to permanent grass or forest cover. No special practices are usually needed, but watercourse protection may be desirable to provide better habitat for fish and wildlife and an improved, less polluted water supply.



Some Class V land would be better under a forest cover.

Class VI and VII land is steeply sloping, may be rough and is subject to severe erosion unless properly managed. A permanent cover of grass or trees is indicated, together with strong restrictions as to use.



PRESENT LAND USE COMPARED TO LAND USE CLASS
IN THE TWO VALLEYS

(Wooded and Built-Up Areas Excluded)

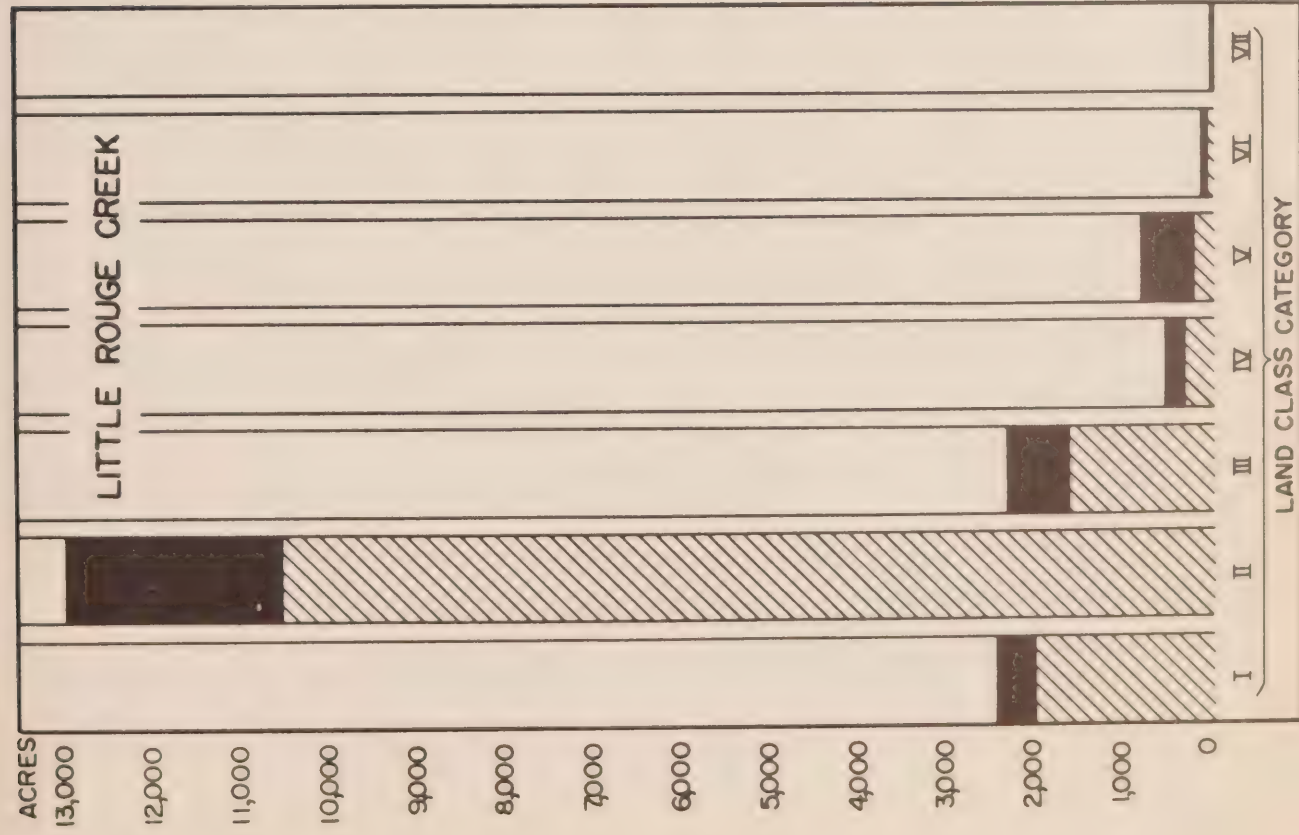
Class	Little Rouge Creek		Claremont Creek	
	Cultivated %	Pasture %	Cultivated %	Pasture %
I	81.3	13.9		
II C	81.5	12.7	71.1	23.9
II R	81.4	14.6	72.7	22.7
II D	79.0	15.8	31.5	63.8
III C	85.6	8.6	65.5	25.3
III R	72.3	21.4	67.3	28.7
III D	58.0	39.4	18.5	77.8
IV P	50.9	43.0	23.1	76.9
IV T	68.9	26.2	51.0	42.9
V	27.2	70.2	12.6	86.4
VI	53.4	46.6	13.3	63.3
VII	13.4	86.6	21.9	37.5
I, II & III	78.9	16.4	65.3	30.1
IV	65.2	29.5	50.3	43.8
V, VI, VII	23.4	74.3	14.4	76.4
Total Watershed	70.5	17.8	49.9	30.7

5. Summary of Tables

(a) Little Rouge Creek

From the first table it can be seen that 84.1 per cent of Little Rouge Creek has been classified as land suitable for cultivation. The second table indicates that only 70.5 per cent of the valley is actually cultivated. This means that on the average 14 per cent of the area is being used for a lower capability than has been recommended.

The average, of course, does not indicate the true picture. The area recommended for cultivation is 78.9 per cent cultivated but under-use is not detrimental to conservation. It is in the areas that have been recommended for occasional and no cultivation that improper use may cause a serious situation. Class IV land should be not more than 20 per

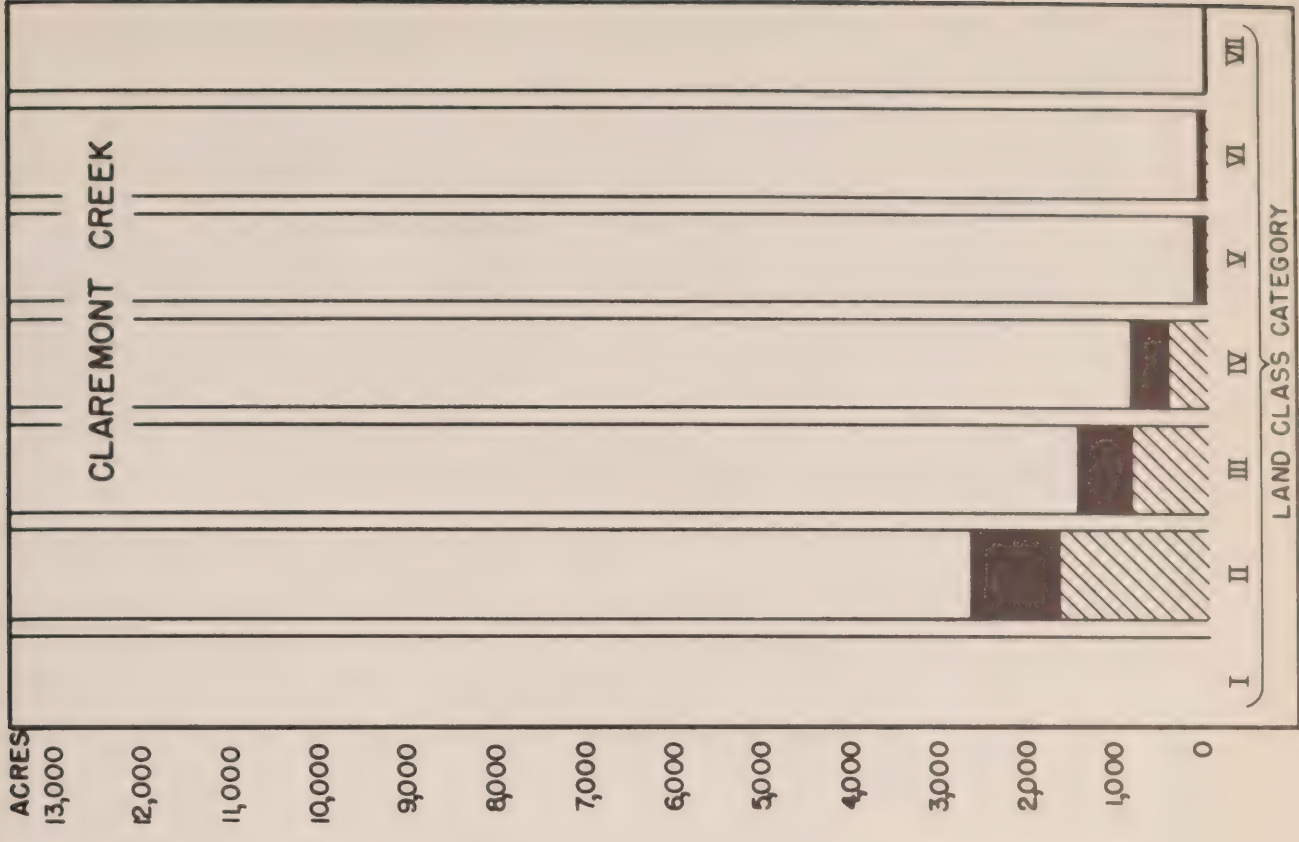


LAND USE CLASSES

—LEGEND—

■ UNCULTIVATED
▨ CULTIVATED

LAND DEVOTED TO WOODLOTS OR
URBAN USE IS NOT INCLUDED



cent cultivated whereas actually it is 65.2 per cent cultivated. The last three classes are 23.4 per cent cultivated and should not be cultivated at all.

Considering the fact that classes IV to VII comprise only 7.4 per cent of the valley there is no real need for cultivation of this land.

(b) Claremont Creek

On Claremont Creek, land suitable for cultivation is 30 per cent under-used, while class IV is 30 per cent over-used and V to VII is 14.4 per cent over-used. In this valley 19.1 per cent of the area is in classes IV to VII so there is a greater problem in fitting actual to recommended land use.

(c)

TABLE TO SHOW ACREAGES OF CULTIVATED AND UNCULTIVATED LAND
IN RECOMMENDED LAND CLASSES

Class	Little Rouge Creek		Claremont Creek	
	Over- Cultivated (Acres)	Under- Cultivated (Acres)	Over- Cultivated (Acres)	Under- Cultivated (Acres)
I,II,III		2,937		722
IV	259		154	
V,VI,VII	212		28	
	471	2,937	182	722

The above table gives a better picture of recommended land use as against present land use. It can be seen that on both valleys only 653 acres are being used more intensively than was recommended and 3,659 acres are used less intensively.

Most of the over-used 653 acres are in the Oak Ridges while the under-used land is in the remainder of the area.

CHAPTER 7

FARM PLANNING

To most farmers the idea of planning is not something new; in some measure or other they plan the use and management of their land so that they know a year or so in advance what cultivation sequence they are going to follow. They plan for repairs to buildings, equipment, fences and so on. They plan so far as they can the day to day and month to month work they are going to do, and much of it becomes routine. Planning, in short, is an essential feature in the life of the farmer as it is with anyone concerned about his future.

Although many farmers have a plan regarding the use to which they put certain or all of their fields, relatively few have had their farms planned so that the maximum use, consistent with the best use, is made of each piece of land. The object of a plan of this sort is to enable the farmer to get the most out of his land and at the same time to do it in such a manner that no damage to the land occurs. When a farm is planned each piece of land is judged according to its capability to produce, and various use recommendations are made. These may include pasture management, crop rotations to follow, woodlot management and reforestation, farm drainage, fenceline removal or relocation, or any other works and practices which would benefit the farmer and his land.

Planning does NOT need to be so rigid that there is only ONE recommended use or management for a piece of land of one class. Alternative recommendations may be made for a piece of land in a certain class. The first rule is to apply the easiest and cheapest remedy. The next thing that determines the choice of use is the relation of the field to the rest of the farm. Other factors apply, such as suitability for using powered mechanized equipment, or the distance from the barn and ease of access. The final determination depends on the crops and animals the farmer chooses to carry. The final

plan, therefore, is the end result of a good many compromises and at each stage of preparing the plan certain choices have to be made.

In this section an actual farm plan, prepared by the Soil Advisory Service of the Soils Department of the Ontario Agricultural College for a farm on the R.D.H.P. Watershed, is presented. The soils are typical of those found over much of the watershed.

In developing the plan a farm planner goes over the farm field by field and maps the soils as he finds them. He uses an aerial photograph as a base map. The soil series and types are identified and an estimation of the degree of erosion is made by examining vertical sections of the soil. The slope of the land is measured, using a hand level which gives slope as a percentage. A rise of four feet in a run of one hundred feet, for example, is a 4 per cent slope.

The occurrence of watercourses, either permanent or intermittent, with or without a definite channel, is noted, as are fencelines, stonepiles, springs, seepage areas, gullies or any other items of importance.

All of the information gathered is marked on the map, using symbols, and each piece of land of the same type with respect to soil, slope and erosion is delimited by a boundary line.

From the map of soil type and conditions a map of use capability is prepared. Each piece of land is assigned to one of eight capability classes. These classes are the same as those used for the watershed and are included here as part of the plan. All classes will not necessarily be found on any one farm.

The plan of the farm is then worked out with the farmer so that each field, or each piece of land, is put as nearly as is practicable to the use which fits the capability. Any systems of tillage or cropping or special practices to

control erosion and water loss are applied where necessary. The fields and rotations are worked out so that there is the correct balance of pasture, fodder and grain to meet the requirements of the herd which the land can carry.

Before the planned rotations are put into effect it may be necessary to arrange a transition period in which the change-over from present cropping to the planned rotation is made without losing a year of cropping. Also, it may take a year or two to get special devices like grassed waterways and terraces in stable condition. A time of transition such as this may also prove useful in providing a period during which any desired changes in the plan may be implemented.

In adjusting use to capability it may not be possible to outline fields exactly according to natural soil conditions. The inclusion of a small area of, for example, Class II land in a field which is predominantly Class I land may mean that this small area of land of lower capability will be worked as intensively as the Class I land. This is not strictly following the principle of "using each acre according to its ability", but is a compromise weighed against the possible cost of fence removal, difficulties of tillage and so on. In a plan, therefore, there may be found one or more small areas of one land class within a larger area of another land class.

FARM PLAN

for

CLARENCE McDOWELL
R.R. 1, Stouffville, Ontario

County - York
Township - Markham
Concession - X
Lot - 22

Prepared by
T.H. LANE
The Soils Department,
Ontario Agricultural College
In co-operation with Mr. Clarence McDowell

SOIL, SLOPE AND EROSION



MAPPING SYMBOLS USED IN FARM PLANNING

MAPPING SYMBOL (EXAMPLE)

382 sil — Soil Type
 3B1 — Degree of Erosion
 — Slope Group
 — Per cent Slope

SOIL TYPES ON YOUR FARM

382 sil — King silt loam
 384 sil — Monaghan silt loam
 386 sil — Jeddo silt loam
 576 sil — Granby sandy loam
 5₃₈₂ sil — Bookton sandy loam

SLOPE GROUPS

UNIFORM SLOPES

A-0-2 per cent	E-15-20 per cent
B-2-6 " "	F-20-30 " "
C-6-10 " "	G-30+ " "
D-10-15 " "	

IRREGULAR (HUMMOCKY) SLOPES


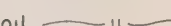
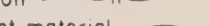
M-0-7 per cent
N-7-15 " "
P-15-25 " "
R-25+ " "

DEGREE OF EROSION

WIND AND WATER EROSION

- 0 — No noticeable erosion
- 1 — Up to $\frac{1}{2}$ of the "A" horizon removed by erosion.
- 2 — Some "B" horizon material in the cultivated layer.
- 3 — Some "C" horizon material in the cultivated layer.
- 4 — Gullies too deep and too frequent for the land to be cultivated
- + — Accumulation of eroded materials.


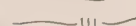



INDIVIDUAL GULLIES

Shallow 
 Into subsoil 
 Into parent material 

STONINESS

- 0 — No stone
- 1 — A few stones but not sufficient to interfere with cultivation.
- 2 — Sufficient stone to be a nuisance to cultivation but land can be used for regular rotation
- 3 — Too much stone for cultivation but land suitable for pasture
- 4 — Too much stone to be used for pasture but suitable for trees

WATERCOURSES

Permanent streams 
 Intermittent streams 
 Spring 
 Sod waterway 
 Proposed tile 

OBJECTIVES FOR FARM PLAN

The following plan for the use of the land on your farm is designed to:

- (a) Be a practical working unit.
- (b) Use the land according to its capability without serious deterioration.
- (c) Maintain the soil at an economically high level of productivity.
- (d) Produce an approximately equal acreage of each crop each year.
- (e) Minimize soil and water losses.

In preparing the plan the following procedure is followed. First, the soil, slope and erosion are mapped on an aerial photograph. Second, the capability for agricultural use is then worked out on the basis of type of soil, stoniness, drainage, steepness of slope and the tendency of the soil to erode. Third, in co-operation with the farmer the farm layout and crop rotations are worked out on the basis of the land-use-capability units (described in the following pages).

Suggested cultural, management and fertility practices are outlined. The location and acreage of any crop in any year is readily found by referring to the cropping schedule.

Discussions on cropland, permanent pastures and woodlots should be supplemented by material found in various bulletins dealing with the different subjects. The material found in such publications is based on years of experience and experimental work and should be adapted to your farm in so far as is practical and applicable.

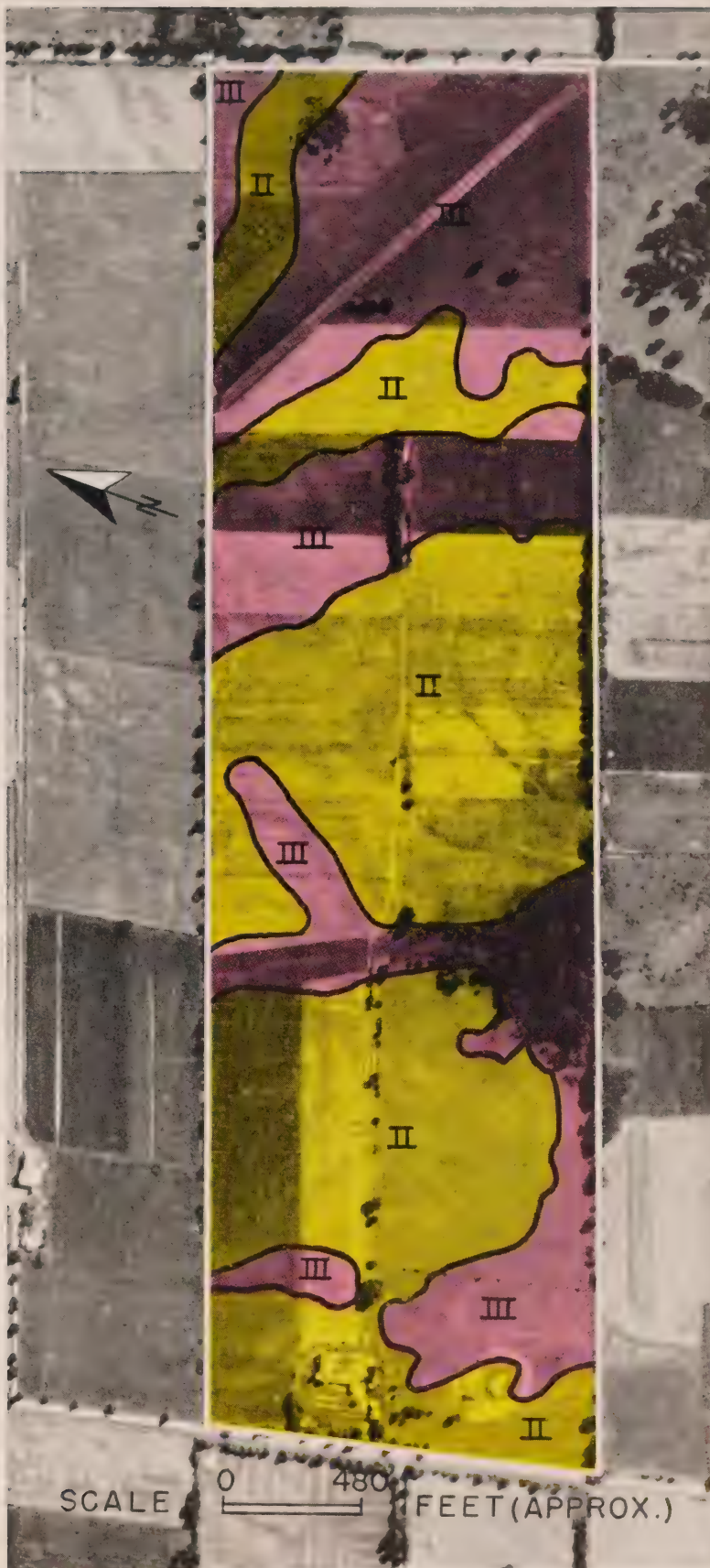
LANDS WHICH MAY BE CULTIVATED

Class I (Green)*

Class I land is suitable for cultivation without special conservation measures. It must be nearly level,

* These classes are not found on the farm described here.

LAND USE CAPABILITY



I	None
II	
III	
IV	None
V	None
VI	None
VII	None
VIII	None

workable, productive, well-drained and not subject to erosion or overflow. This land requires the addition of plant foods that are used by crops or lost by leaching. These plant foods are returned by barnyard manure, green manure crops or commercial fertilizers. Crop rotations to assist in maintaining the productivity are recommended.

Class II (Yellow)

Class II land is suitable for permanent cultivation with some simple practices often required. Chief types of practices are erosion control, water conservation, correction of moderately low fertility and the removal of boulders. The practices to conserve soil and water include contour cultivation and strip cropping with crop rotations that include legumes and grasses. The various sets or combination of practices must always be practical and useful in maintaining soil productivity.

Class III (Red)

Class III land is suitable for permanent cultivation with intensive conservation measures. This land requires careful and intensive application of practices to conserve soil and water. The type of practices are similar to those applied on Class II land but their use must be more intensive and widespread. Class III land requires longer rotations of legumes and grasses, cropping in narrower strips, buffer strips, grassed waterways, diversion ditches and greater use of cover crops. Class III land is generally characterized by one or more of the following features: steeper slopes, greater degree of erosion, lower fertility or handicapped by stones, boulders and poor drainage. This land requires additional treatments to maintain the soil at adequate fertility levels for the production of moderate to high yields of good quality crops.

Class IV (Blue)*

Class IV land is suitable for occasional or limited cultivation. This land is generally handicapped by one or more of the following: steeper, more severely eroded, more susceptible to erosion, more difficult to drain, less fertile, droughty or restricted in use by stones, boulders, or scrub tree growth. The types of conservation measures applied to this class aim at removing, in so far as possible, the limiting features. To reduce soil losses and conserve rainfall on the steeper slopes, five- to six-year rotations consisting of one year grain and the rest in clovers and grasses are frequently used. Class IV land may be set aside as a pastured area to be broken up and reseeded every fifth or sixth year.

LANDS WHICH SHOULD BE KEPT IN GRASS OR TREES

Class V (Dark Green)*

Class V land is not suitable for cultivation but is suitable for a permanent vegetation that may be used for grazing or woodland. This land is not subject to erosion but is generally too wet or stony for cultivation.

Class VI (Orange)*

Class VI land is suitable for permanent vegetation that may be used for restricted grazing or woodlot. Most of the land is moderately eroded or steep droughty soils of low fertility. When used for grazing such restrictions as carrying capacity, deferred grazing and rotation of grazing must be practised.

Class VII (Brown)*

Class VII land is not suitable for cultivation and requires severe restrictions if used for grazing. Pastures generally require liberal applications of fertilizers and careful regulation of the grazing. A large part of this land

* These classes are not found on the farm described here.

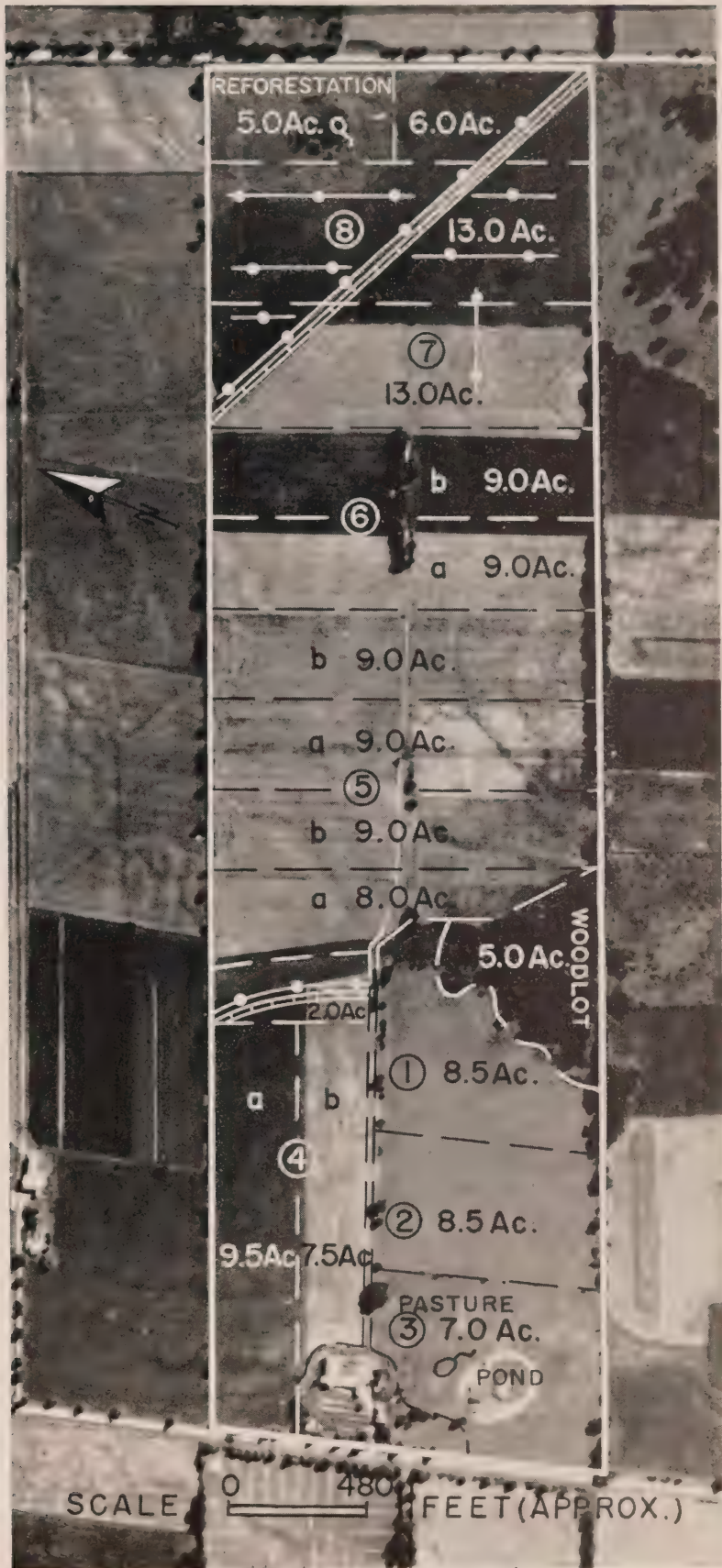
should be reforested or kept in woodlot and fenced from livestock. Most of the land in Class VII is steep, rough, eroded and highly susceptible to erosion.

Class VIII (Purple)*

Class VIII land is not suitable for cultivation or the production of permanent vegetation. The land is chiefly rough, extremely stony barren land or swamps and marshes that are permanently wet and cannot be drained.

* These classes are not found on the farm described here.

FARM PLAN



CROP ROTATIONS AND ANNUAL ACREAGES

		YEAR					
<u>Field No.</u>	<u>Acreage</u>	<u>55</u>	<u>56</u>	<u>57</u>	<u>58</u>	<u>59</u>	<u>60</u>
<u>Pasture Rotation</u>							
1	8.5	SGs	H ₁	H ₂	H ₃	H ₄	SG
2	8.5	H ₄	SG	SGs	H ₁	H ₂	H ₃
3	7.0	H ₂	H ₃	H ₄	SG	SGs	H ₁
<u>Four Year Rotation</u>							
4(a)	9.5	SGs	H ₁	H ₂	FW		
6(a)	9.0	SGs	H ₁	H ₂	FW		
4(b)	7.5	H ₂	FW	SGs	H ₁		
6(b)	9.0	H ₂	FW	SGs	H ₁		
5(a)	17.0	FW	SGs	H ₁	H ₂		
5(b)	18.0	H ₁	H ₂	FW	SGs		
<u>Tiled Area</u>							
7	13.0	C	C	H	H		
8	13.0	H	H	C	C		
Fall Wheat (FW)	17.0	16.5	18.0	18.5	17.0	16.5	
Spring Grain (SG)	27.0	25.5	25.0	25.0	25.5	25.5	
Corn (C)	13.0	13.0	13.0	13.0	13.0	13.0	
Hay (H)	63.0	65.0	64.0	63.5	65.5	65.0	
Cropland	120.0						
Permanent Hay	2.0						
Pond Area	3.0						
Homestead and Lanes	3.0						
Additional Acreage	6.0						
Woodlot	5.0						
Reforestation	5.0						
Total Acreage	144.0						

The farm is operated as a dairy enterprise with grain corn as the major cash crop. Practices recommended are based upon the soil conditions existing in relation to the livestock enterprise.

Cropland

This plan presents suggestions for soil management and crop rotations that meet the aims and objectives of good land use, conserving soil fertility and controlling soil erosion while maintaining a high level of production.

The preceding map of the farm gives the field layout, number of fields, acreages, and plan of operations. This will serve as a key to cropping rotations.

Rotations and Practices

The rotations outlined for the farm are for three main purposes: pasture, hay and grain, and cash crop.

The pasture rotation is a six-year rotation which provides for pasture renovation at the end of four years in pasture. The pasture mixture should contain legumes and grasses suitable for both well-drained and imperfectly drained areas in the pasture fields - consult Circular 239 Hay & Pasture Mixtures for Ontario.

The hay and grain rotation is a four-year rotation of two years grain and two years hay. This rotation is followed on the more rolling section of the farm along with field strip-cropping. Alternate strips of grain and hay reduce the amount of erosion likely to occur. The fall wheat in the rotation may be substituted either partially or wholly by intertilled crops or other grains. Where intertilled crops are planned in this rotation winter cover crops or manure mulches should be practised. The two-year hay mixture should consist of an alfalfa-grass mixture.

The cash crop rotation is planned for the tile-drained section of the farm. Here erosion is not a serious

problem. Frost damage may occasionally occur to the grain corn crop before it is matured. The rotation suggested is two years of corn followed by two years of hay. In this case the hay-mixture is seeded without a nurse crop such as spring grain. If preferred, spring grain may be used as a nurse crop and the hay left for one year only.

Field strip-cropping is a conservation practice which is adaptable on this farm. Because of the generally uniform direction and amount of slope the strips are laid out parallel and of even width across the direction of slope. There should be no difficulty in maintaining and cultivating these strips.

Fertility Maintenance

Soil analyses indicate the need for complete fertilizers for both the grain and the corn crops.

Applications of manure and fertilizer should be made on the hay-pasture fields to maintain high production.

The hay-pasture mixtures would benefit substantially from additional phosphorus and potash in the fall. New seedings particularly should have a phosphorus-potash application in early fall (September 1st).

Where the alfalfa stand has decreased to less than 50% of the hay-pasture mixture a complete fertilizer should be applied in the spring rather than a fall application of phosphorus and potash.

In order to maintain a good fertility balance soil samples should be taken and sent to the Department of Soils, O.A.C., for analysis and fertility recommendations.

Drainage

Tile drainage is necessary before grain corn can be successfully grown at the rear of the farm. A system of tile drains must be carefully installed and the outlet properly looked after.

Grassed Waterway

The drainage ditch at the rear of the farm should be shaped into a grassed waterway. To one side of the waterway a tile may be necessary to allow crossing of the waterway with machinery.

The seeding mixture should contain grasses that will provide a dense growth and withstand the temporary flooding conditions existing in the waterway during spring floods.

Clipping of the waterway should be done at least twice a year.

Pond

No recommendations for the pond area are included in this plan. However, its proximity to the buildings and the pasture area will provide excellent facilities for recreation, fire protection and livestock watering.

Woodlot

The woodlot area is also suitable as a pond site and a possible wildlife habitat. The woodlot should be fenced in order to make it a more suitable habitat for wildlife.

Fence and Lane Removal

In order to facilitate field strip-cropping the fence and lane should be removed from the rear half of the farm. This will allow clearing up of the lane area and working across with the field-strips. The lane to the back of the farm will become temporary and worked up as each strip is worked.

The grove of trees in the lane should not be removed.

Seeding Failures

Failures occur under the best of conditions.

However, improved soil conditions will greatly modify failures. Where failures do occur, it is a matter of reseeding the field again and leaving another field in hay one year longer. In this manner, the rotation is maintained.

Reforestation

Trees may be planted on this area. For further information consult the Department of Lands and Forests.

The farm illustrated here is of particular interest in that many of the recommendations made have been carried out. If the farm plan photograph is examined closely, it will be seen that the pond has been built, the waterway at the back of the farm has been opened although not sodded, the area of the short grassed waterway has been preserved, and the strip-cropping carried out much as recommended. All of these measures, together with the others specified, will play their part in making the farm operations easier and the farm itself more productive.

CHAPTER 8

PROGRAM EFFECTUATION

1. The Recommended Land Use Maps

Maps in colour showing the recommended land use classes for the two valleys accompany this report. These maps sum up all of the natural features of the land in terms of its best use from the conservation point of view. They can, therefore, be considered as guides to future use of land, but it should not be construed that they are unchangeable plans of how the land must be used. However, the more closely use and management of the land fits the recommendations, the more nearly soil and water conservation will be achieved.

Any adjustment in land use, or the introduction of any special methods of tillage or cropping, need not reduce the acreage devoted to field crops. Indeed, the application of conservation methods and principles would increase production and improve the soil and water conditions in both areas.

2. Getting the Job Done

The improvement of soil and water resources in an area is a responsibility which belongs both to the individual and to the community of which he is part. No program of valley improvement of the kind visualized in this report can ever fully succeed unless the individual and the community are prepared to work together. Conservation of soil and water helps both the farmer and the community.

The foremost of things that might be done is that of having every farm in each watershed planned. It is therefore suggested that the Authority consider employing a man for a summer, or longer if need be, whose responsibility it would be to contact each farmer on the watershed. At this time the benefits to be derived from a farm plan would be pointed out and his co-operation requested. It is likely that on most farms more than one visit would be necessary.

Periodically the progress made in this program should be reviewed and publicized at a public meeting or in any other way convenient and the degree of Authority participation and assistance made known. The program would, of course, be carried out in co-operation with the County Agricultural Representative, who would arrange to have the farm plan surveys made, and with the Zone Forester concerning woodlot management and reforestation.

The Authority should also keep it in mind that other groups will be interested in the whole question not only in the Little Valleys but throughout the R.D.H.P. area. These groups may include the Boy Scouts, Junior Farmers, Soil and Crop Improvement Associations, Angling Clubs and various associations and service clubs. The dealers in feeds, seeds, implements and fertilizers should not be forgotten, for their livelihood depends on a prosperous agriculture.

Organizations and individuals might, under leadership of the Authority and with its direct aid where this is feasible, help in the reclamation of gullies, the reforesting of suitable land, the improvement of the streams and any other work which should be done. Ploughing associations can, for instance, help by learning and teaching tillage methods especially applicable to erosion control. Junior Farmers could use competition, as they now do in cattle judging, to create interest in and develop knowledge of soil conditions.

FORESTRY

CHAPTER 1

THE FOREST IN THE PAST

1. At the Time of Settlement

Good early descriptions of the forests of Southern Ontario are rare, for the early settler regarded the forest more as an obstacle to cultivation than as a positive asset worthy of recording. However, a fairly good picture may be obtained by piecing together the scattered information which does exist. Such early concern as there was with timber resources centred around pine and oak for the British navy and the easily cut softwoods for building purposes. Fuelwood was important, but was everywhere abundant and not worthy of special note. In addition the type of timber was of indirect interest as an indication of the quality of the land; pine and oak forests indicating light, easily worked soil, and maple and beech stands suggesting richer but heavier soils. Such a classification was given by David Gibson, writing from Markham in 1827:*

"The price varies according to the quality of the lot. Land with maple, basswood, beech and a few pine, on it is thought to be the first rate sort of land in the Home District, but where it is most of pine or hemlock it is most commonly too much sand. The other is chiefly sand and Clay, when it is chiefly beech it is generally a very hard clay bottom. In low swamp places, where generally grows White Cedar, in other low ground that is wet in spring and fall grows Blackash, Basswood and sometimes Hickory."

Although some of the earliest survey notes (1793) were very scanty, the surveyors by 1795 seem to have been observing the following instructions:

"Your field book is to be kept in the accompanying form, comprising the kind and quality of the soil and timber, entering each kind of timber in the order of its relative abundance."

In accordance with these instructions, the surveyor's notebooks included a running account of the composition of the forest cover along every line they ran, and thus they provide a reasonably accurate picture of the original bush in each township surveyed.

* Ontario Historical Society, Papers and Records, Vol. XXIX.

From the surveyors' field notes it is clear that they worked through a forest almost unbroken except for an occasional open bog or patch of windfall. In the valleys they found "ash swales" and cedar swamps or "tammerack" (which one surveyor refers to as "Cyprus"). On the valley slopes hemlock was common. The heavier upland soils were covered with stands of hard maple, elm, beech and basswood. On sandy areas oak and pine were more abundant, but the best quality pine trees seem to have been those scattered through the hardwood stands on the better soils.

Little note was made of the quality of timber, but Jones, who took more interest than other surveyors in this matter, made the following notes in his Scarborough surveys of 1793-95:

On the line between Concessions B and C -

"Timber tall pine Beech and maple"

On the 4th Concession line at Lots 16 and 20 -

"large pine"

Again, in his 1797 survey of the 5th Concession of Pickering he says,

"The timber in General is tall being mixed with Maple Elm Beech, and *black Oaks".

The botanist, John Goldie, travelling through the south part of Scarborough in 1819, remarked:

"For a number of miles today I passed through barren sandy pine woods which it is probable will never be cleared."

Smith's Canadian Gazetteer of 1846 contains further impressions of the district:

Scarborough Township: "The land bordering the lake is mostly poor, and the timber principally pine; in the rear of the township the land improves, and the timber is mostly hardwood."

Pickering Township: "The land in the interior of the township is rather hilly, and the timber of a large proportion of it is pine."

* Jones seems commonly to have used this name for the red oak, Quercus borealis. It is likely that the range of black oak, Q. velutina, in this area does not extend east of Toronto.

Markham Township:

"The land is gently rolling, and the timber a mixture of hardwood and pine."

Uxbridge and Whitchurch Townships:

"A succession of pine ridges traverses the district; running through ... the centre of Uxbridge and Whitchurch."

Rouge River:

"It is a good mill stream, and there is some excellent timber on the banks."

2. Clearing the Land

The attitude of the early settler to the forest was completely hostile. Typical of the day is the comment of Iredale while surveying the Markham - Scarborough boundary in 1793 -

"the Land Good, but in general heavy timbered on this Line."

Although the forest supplied the settler's meagre needs for construction material and fuel, this was but a drop in a seemingly limitless sea of supply. Transportation was poor, and markets for his woodland produce extremely limited. For agriculture to develop, the forest must go, and much of it was simply piled and burned. Settlement duties required a certain amount of land to be cleared before a patent could be obtained. For a period after January, 1820, this obligation included the cutting of all trees on a strip 165 feet deep across the entire front of each lot.

When a new area was opened for settlement the best land was naturally taken first and the rough and swampy areas were avoided. Land was cleared first along the fronts of the farms and the woodland cut farther and farther back toward the end of the farm which lay farthest from the road. This was done, in many cases, without reference to the quality of the soil except where it was swampy.

The accompanying table gives an estimate of the remaining woodland at various dates in the townships making up

REMAINING WOODLAND IN PER CENT
ESTIMATED FROM CENSUS OF CANADA FIGURES

Township	1851	1861	1891	1911	1921	1931	1941	1951	1954 * Survey
King	64.6	45.0	15.2	7.1	8.5	9.9	10.9	9.5	0.0
Markham	42.7	31.6	8.9	5.4	3.6	4.0	4.1	3.9	4.7
Pickering	45.0	32.9	8.4	3.9	6.1	6.0	6.6	7.3	9.7
Scarborough	73.2	33.6	8.3	7.2	6.5	6.7	4.2	7.5	9.6
Uxbridge	82.2	68.1	19.3	10.7	11.7	13.6	13.3	14.0	19.2
Vaughan	49.9	38.5	14.5	5.3	8.3	7.2	7.1	7.3	5.6
Whitchurch	59.8	47.8	19.5	8.0	9.8	9.9	11.1	9.9	9.7
Total	59.5	41.4	13.2	6.6	7.6	8.0	8.4	8.3	9.3

* Survey figures refer only to that part of the townships within the R.D.H.P. watersheds. They do not include plantations.

the R.D.H.P. Watersheds. Although slight irregularities appear in the table, due to incomplete information, the general trend of events is obvious. Until about 1910, the decrease in woodland was rapid. After that the small remaining area of woodland was at least tolerated, and in some cases has probably shown a slight increase. Except in Uxbridge Township there is not as yet any evidence of a sharp increase in woodland cover such as might be brought about by a real enthusiasm for reforestation of submarginal lands.

The figures from actual measurements made in the 1954 survey, given in the last column for comparison, refer only to that part of the township within the watershed. Due to varying topography this part may be more heavily or less heavily wooded than the township as a whole. In part, however, these differences may simply reflect different opinions as to what should be classified as woodland. The condition of the remaining woodland is described in the following chapter.

3. Forest Products

The earliest interest in timber in Ontario was the reservation of pine and oak either by specified areas or by individual marked trees for the use of the British navy. Complete records for the R.D.H.P. area are not available, but those for Pickering dated 6th December, 1797, list thirty-one lots from the 2nd^{*} to the 9th Concessions containing "a great many" pine from 8 to 12 feet in circumference and 140 feet to 170 feet high, with seventeen more lots containing "a few trees of this description." At the bottom of the list is a note: "There is not any Oaks fit for the Royal Navy in the aforementioned concessions." Standards were high.

The square timber trade commenced, no doubt, somewhat later than the mast trade* and was carried on simultaneously with it from the thirties.

* Jones was instructed not to mark "masting reserves" south of Con. II, because the land had been granted four years before without reserving the pine. There was a "pine ridge" between Dundas Street and the lake from the Rouge to Frenchman's Bay. Traces of this could be plainly observed up to the 1930's.

Square timber was obtained by selecting large trees, mostly white pine, and squaring the best part into one long stick. In the earliest days of the industry the timbers were squared on all four sides to a fine "proud edge", but later, when the best timber had been cut, they were squared with a rounded shoulder or "wane", and were known as "waney timber". Such methods, of course, were wasteful since the finest grained wood was sacrificed in the operation, but this was the type of material called for by the British market.

"Often only one tree in a thousand would yield a finished 'stick' (so was the heavy square timber nonchalantly called in the trade) fit for export. A good stand might yield thirty or forty trees an acre for over the whole area allowances had to be made for 'wants' - the non-bearing patches of swamp, burn, etc. Today a whole township or limit (in Northern Ontario) may not have one good square stick of the quality of the square timber of another day." *

Until 1890 the Census of Canada lists all pine and oak not sawn into lumber as "square timber", and even as late as 1910 most species are listed as "square, waney or flattened".

As settlement and trade grew, sawmilling became important. It is uncertain when the peak was reached in this industry. W. H. Smith in 1846 reported a total of 80 sawmills in Scarborough, Pickering, Markham, Whitchurch and Uxbridge Townships. In the previous year Pickering alone exported about 3,000,000 feet of lumber. By 1851 the number of mills had increased to 94. As trade conditions improved, sawmilling flourished. Not only good export conditions, but also a vigorous local demand stimulated forest production. From 1840 to 1870 a large amount of lumber and squared timber was used for local construction, and particular species were in demand for the manufacture of vehicles, furniture, barrels and woodenware. Building by journeymen carpenters had slacked off by 1875. The making of vehicles continued until about 1890.

* A Hundred Years A'Fellin', written for Gillies Bros., Ltd., by Miss Charlotte Whitton.

FOREST PRODUCTS - YORK COUNTY
Estimated from Census of Canada Figures

Products	Species	Unit	1870	1880	1890	1900	1910	1920	1930	1940	1950
Pulpwood		Cords				39	7	75			
Tanbark		"	1,689	1,480	1,833	329	7				
Lathwood		"	57	1,925	4,166						
Masts & Spars		Number	27	420	5	3					
Staves		M	303	422	105	\$955	\$342				
Fence Rails		Number						12,397	6,878		
Fence Posts		"			53,053	25,038	10,099	11,397	9,200		8,816
Poles		"			1,230	167	1,476	80	248		141
Railway Ties		"			13,240	2,931	300	50			
Shingles		"			3,875M						
Piling		"									
Fuel Wood		Cords	135,917	156,609	86,316	51,956	26,863	33,184	24,065	24,493	7,926
Square Timber & Logs	Ash	Cu.Ft.				636	114				
	Birch & Maple	"	642	105	6,825	1,588	5,480				
	Black Walnut	"		250							
	Butternut	"									
	Elm	"	4,089	5,617	17,722	15,324	5,078				
	Hickory	"	1,000	350							
	Oak	"	24,340	17,935	12,875	480	1,418				
	Pine	"	81,515	992,399	562,750	10,929	23,863				
	Tamarack	"	4,576	4,360	6,139						
	Others	"	193,474	38,458	317,120	8,574	1,140				
Lumber	Pine	M bd.ft	12,850	31,946	5,590	483	143	895	407		434
	Others	M bd.ft	1,135	8,396	7,466	4,372	751				
Other Products		\$						535	258	5,203†	7,788

† Includes lumber, posts and poles

M= Thousand (1,000)

FOREST PRODUCTS - ONTARIO COUNTY
Estimated from Census of Canada Figures

Products	Species	Unit	1870	1880	1890	1900	1910	1920	1930	1940	1950
Pulpwood		Cords			6,382	520	47	379	1,995	82	
Tanbark		"	976	1,240	2,577	3,151	42				
Lathwood		"		1,866	1,604						
Masts & Spars		Number	20		38	6	2				
Staves		M	305	326	87	\$2,350	\$383				
Fence Rails		Number						1,540	4,923		
Fence Posts		"			124,044	27,545	24,225	16,165	18,378		14,177
Poles		"			7,358	1,082	2,002	369	831		482
Railway Ties		"			155,447	3,293	1,958	1,680	85		
Shingles		"			8,287M						
Piling		"				2,124	100				
Fuel Wood		Cords	116,797	124,761	140,129	81,644	44,621	49,363	37,047	37,111	12,839
Square Timber & Logs	Ash	Cu. Ft.				566	1,840				
	Birch & Maple	"	600	5,574	8,763	1,040	3,330				
	Black Walnut	"		360							
	Butternut	"		195							
	Elm	"	18,058	21,045	16,679	2,275	8,846				
	Oak	"	22,404	3,517	310	150	11,000				
	Pine	"	113,848	61,033	21,346	5,049	8,010				
Lumber	Tamarack	"	31,620	3,187	8,844						
	Others	"	496,445	130,817	42,789	17,958	40,058				
	Pine	M bd.ft.	33,815	62,107	24,679	10,260	577	481	763		693
Other Products	Gtners	M bd.ft.	1,625	4,565	7,285	13,772	2,094				
		\$						242	555	11,536†	1,545

† Includes lumber, posts and poles

M= Thousand (1,000)

A comparison of the County Atlas of 1878 with Tremaine's map of 1861 would suggest that by the latter date the number of mills had already begun to decline.

A study of the accompanying tables of forest products reveals many changes. While the varying basis used for Census of Canada returns at different periods makes comparisons difficult, some general trends are quite clear. The peak production shown for most products is in 1880 or 1890. Soon after 1900 such products as tanbark, lathwood, masts, staves, shingles and piling drop from the list, and production of other products shows a sharp decline. The one product which has persisted throughout the record is fuelwood, which has dropped from a peak of 281,370 cords in 1880 for the combined counties of York and Ontario to a low of 20,765 cords in 1950. This decline reflects both the decrease in available supply and the increasing competition of other fuels.

The addition in 1890 of fence posts, poles and railway ties reflects the development of the area. The introduction of wire fencing, the development of the telephone and the expansion of telegraph service all stimulated forest production at this period. The subsequent sharp decline in these products shows the rapid depletion of supplies.

Tamarack was an important timber until 1890 when the species was almost wiped out by the depredations of the larch saw-fly. The amount of walnut, butternut and hickory cut was never large, and after 1880 these species disappear from the record.

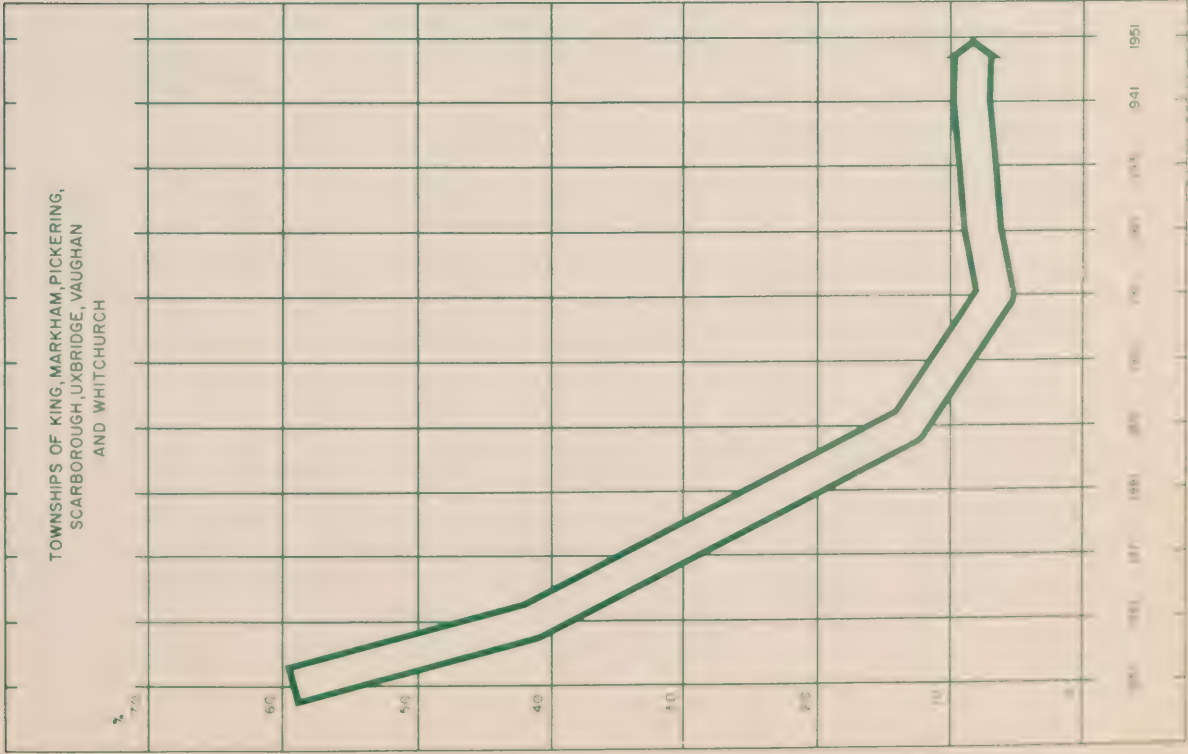
In 1920 no square timber is shown, and from this time on lumber production is small and is no longer separated by species.

Maple sugar was almost the only sugar available to the pioneers. In 1911 census records begin to list maple syrup as well, indicating the change from a pioneer necessity to a modern luxury. For the sake of comparison the accompanying table shows these products expressed as an equivalent amount of syrup. Production in 1951 was less than 7 per cent of that for the peak year of 1861.

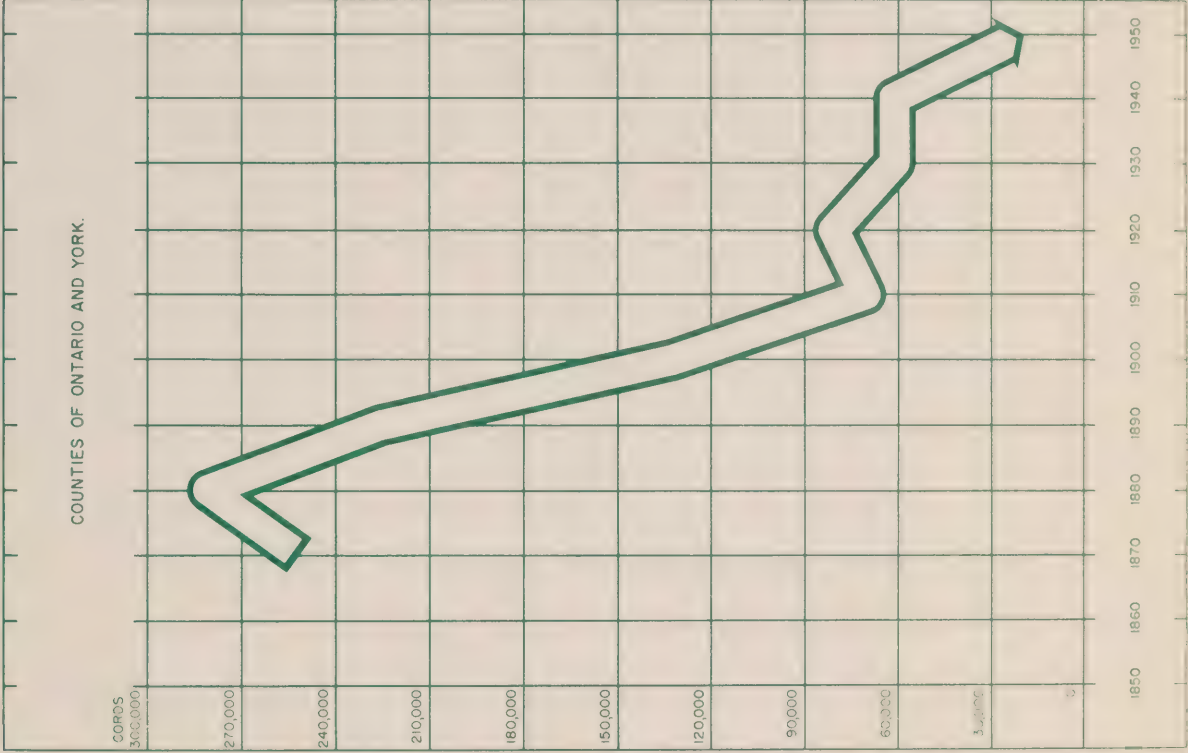
MAPLE PRODUCTS CALCULATED AS SYRUP
FROM CENSUS OF CANADA FIGURES

County	1851 Gals.	1861 Gals.	1871 Gals.	1881 Gals.	1891 Gals.	1901 Gals.	1911 Gals.	1921 Gals.	1931 Gals.	1941 Gals.	1951 Gals.
York	16,394	19,476	11,452	3,881	3,019	2,502	4,280	2,222	4,475	1,530	1,328
Ontario	17,746	19,977	8,003	2,199	5,492	2,390	2,971	3,548	3,387	1,940	1,371
Total	34,140	39,453	19,455	6,080	8,511	4,892	7,251	5,770	7,862	3,470	2,699

PER CENT WOODLAND

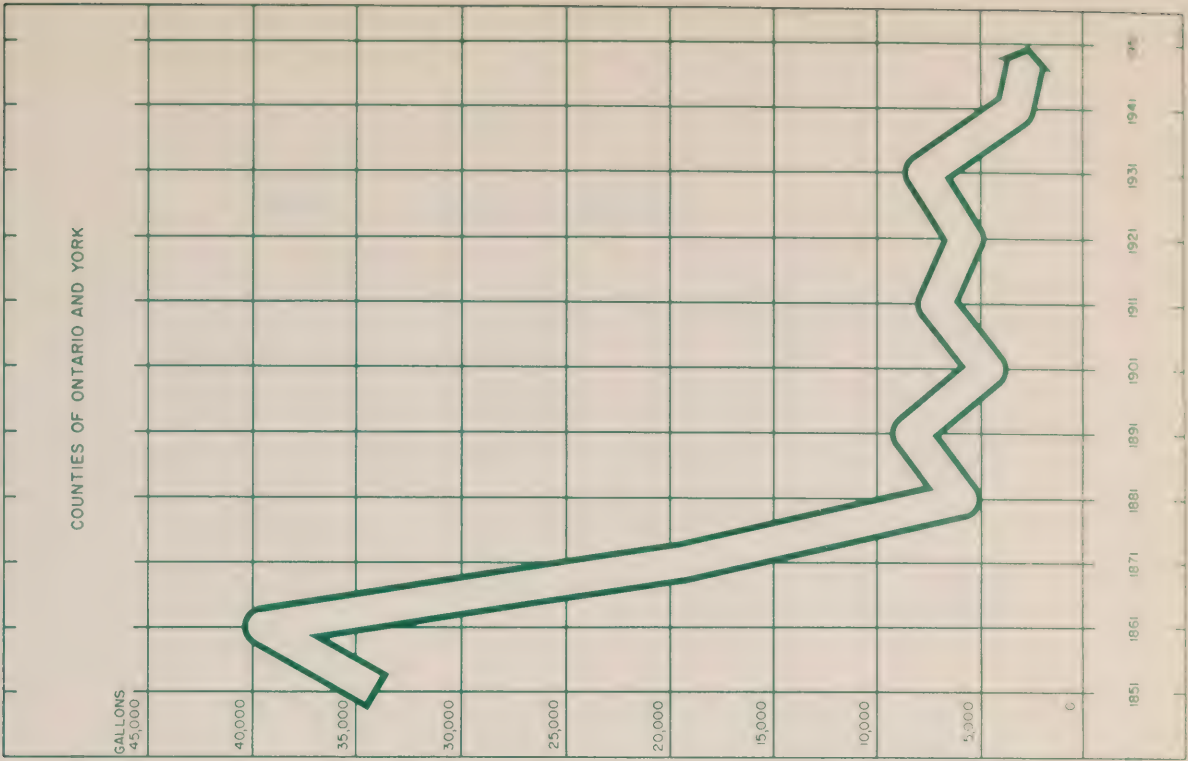


FUELWOOD PRODUCTION



MAPLE PRODUCTS

(EXPRESSED AS GALLONS OF SYRUP)



CHAPTER 2

SURVEY OF PRESENT WOODLAND

An accurate inventory of the existing woodland in the watershed and an estimate of its present condition is a basic necessity in establishing a woodland conservation program. Therefore a detailed study was made of all woodlands, scrubland, plantations and land which is suitable for reforestation.

The entire R.D.H.P. area lies within the Huron-Ontario Section of the Great Lakes-St. Lawrence Forest Region.* In this forest section, as a whole, the prevailing association of forest trees is dominated by sugar maple and beech and this association is described as the climax type† for the area. Occurring in this climax type are other associated species such as basswood, white elm, yellow birch, white ash, hemlock and white pine. After disturbances such as cutting or fire this climax type may be replaced for a time by poplar and white birch. On local or specialized sites such as river bottoms and swamps there occur other aggregations of trees which may bear no relation to the typical or climax forest of the area; for example, an association where white cedar is the dominant species. These distinctive local combinations of tree species are in response to very local climatic, soil, topographic and drainage features.

1. Survey Methods

Aerial photographs, each covering about 1,000 acres, were provided to the forestry party, and mapping in the field was done directly on the photographs. Each area of woodland, scrubland, swamp and rough land was visited and

* W.E.D. Halliday. A Forest Classification for Canada, 1937.

† The climax type is the one best suited to maintain itself permanently under the climatic conditions of a given area. Unless disturbed by fire, axe, or other agents it will eventually take possession and hold most of the area against the competition of other trees.

described as to acreage, cover type, presence of grazing, reproduction, and average diameter of trees at breast height.

Each woodlot was classified as hardwood, coniferous or mixed. The term "hardwood" is used to denote all broad-leaved trees regardless of their physical hardness. A woodlot in which 80 per cent or more of the trees are hardwoods is called a hardwood stand; one in which 80 per cent or more of the trees are conifers is called a coniferous stand; and all other stands are classed as mixedwood..

Plantations were likewise examined and records made of method of planting, approximate age, care, damage and survival.

Land suitable for reforestation was mapped, and descriptions prepared in some detail for the larger areas.

2. Forest Cover Types

The term "forest cover type" refers to those combinations of tree species now occupying the ground, with no implication as to whether these types are temporary or permanent. A slightly modified form of the system drawn up by the Society of American Foresters has been used on this survey so that the system will adequately describe the cover types common to the watershed. The gaps in the numerical system are due to certain cover types common to the eastern United States which do not enter Canada.

The following cover types were encountered on the R.D.H.P. Watersheds.

<u>Type Number</u>	<u>Name</u>
4	Aspen
4a	Poplar - oak
5	Pin cherry
6	Paper birch
8	White pine - red oak - white ash
9	White pine
10	White pine - hemlock
11	Hemlock
12	Sugar maple - beech - yellow birch
13	Sugar maple - basswood
14	Sugar maple
14a	Black cherry
15	Yellow birch
24	White cedar



*Second growth white pine and red pine — one of the few natural stands remaining.
Reforestation will restore such valuable crops to land unsuited for agriculture.*

<u>Type Number</u>	<u>Name</u>
25	Tamarack
26	Black ash - white elm - red maple
47	Black locust
49	White oak - black oak - red oak
50	White oak
51	Red oak - basswood - white ash
52	Red oak
57	Beech - sugar maple
58	Beech
59	Ash - hickory
60	Silver maple - white elm
60a	White elm
88	Willow
MAM	Manitoba maple

Although twenty-eight cover types were identified in the watershed, over 84 per cent of the woodland acreage is contained within five cover types. In order of the area which they occupy these types are as follows:

Type 24 - White cedar, which occupies 4,859 acres or 26.5 per cent of the woodland acreage. This type occurs most commonly on the muck soils of the swamps where it has such associates as black ash, white elm, tamarack, red maple, black spruce, yellow birch, hemlock, white pine and white birch. Where lime is plentiful white cedar may extend even to the droughty upland slopes where it tends to form pure stands.

Type 14 - Sugar maple, which occupies 4,704 acres or 25.7 per cent of the woodland acreage. Except in the dry sandy sections this type and the closely related Type 57 (beech - sugar maple) originally covered most of the upland or better drained areas of the watershed but, since it occupied land which was considered fertile and with good moisture conditions, much of it was cleared to make way for agriculture. Common associates of the type are white elm, white ash, basswood, black cherry and hemlock, with butternut, yellow birch and rock elm typically occurring in the lowland locations of the type.

Type 57 - Beech - sugar maple, which occupies 11.3 per cent of the woodland acreage. This is regarded as the typical association forming the climax type for the uplands of the region. Its associates are hemlock, white elm, basswood, white ash and black cherry, with hornbeam an important subordinate. The type, like Type 14 (sugar maple), was formerly very extensive in the area but, because it occupied the best land, its area has been tremendously depleted.

Type 60a - White elm, which occupies 10.7 per cent of the woodland acreage. Type 60a is very similar to the silver maple - white elm swamp type, but often occurs on somewhat drier sites.

Type 4 - Aspen, which occupies 10.1 per cent of the woodland acreage. Aspen is a pioneer type coming in after clear-cut operations, overgrazing or fire. It quite frequently is the invasion species on abandoned fields and pastures. Though it avoids the wettest swamps it does grow on soils that are wet throughout a good part of the year, and occur as well on the droughty soils. Its associates may be large-toothed aspen, balsam poplar, red cherry, white elm and paper birch. An understory of dogwood or of spruce and balsam fir on the wet sites, or of tolerant hardwoods on the drier sites, is frequently present.

The remaining 23 cover types are present in amounts which vary from 3 per cent of the woodland within the watershed to trace amounts of two acres. Briefly these cover types may be described as follows:

Type 4a - Poplar - oak is probably a result of fire in a former oak - pine type.

Type 5 - Pin cherry is a pioneer cover type after cutting or fire.

- Type 6 - Paper birch is another pioneer species.
- Type 8 - White pine - red oak - white ash commonly occurs on moist but well-drained soils, but on the drier oak ridges where it is found on the R.D.H.P. the ash is often lacking.
- Type 9 - White pine, most common on light sandy soils.
- Type 10 - White pine - hemlock, favours moister, cooler sites, ravines and north slopes.
- Type 11 - Hemlock, similar to above type, but with hemlock predominant over any single associate.
- Type 12 - Sugar maple - beech - yellow birch is a cover type which is close to its southern range (latitude and altitude) within this watershed. Consequently it has a limited distribution.
- Type 13 - Sugar maple - basswood is another cover type in which hard maple is an important component of the stand. This type is important due to the demand for basswood logs.
- Type 14a - Black cherry, occurs in small patches on fertile well-drained soils; a temporary type following clear-cutting.
- Type 15 - Yellow birch, usually occurs on moist sites in small patches following cutting or other opening up of the forest.
- Type 25 - Tamarack occurs on muck swamp with little or no drainage.
- Type 26 - Black ash - white elm - red maple, occurs on moist to wet muck soils, often with mixtures of balsam fir, balsam poplar, yellow birch and white cedar.
- Type 47 - Black locust, not native but may escape from plantations. Prefers dry, limey soils.
- Type 49 - White oak - black oak - red oak, occurs on dry slopes of the Rouge Valley. Being north of its main range, the type does not correspond exactly to its name, and black oak is absent.

FOREST COVER TYPES

Township	No. of Acres	4	4a	5	6	8	9	10	11	12	13	14	24	26	49	50	51	52	57	58	60	60a	88
King																							
Markham	2,767	353					26	11	77		74	766	571	88				8	176	2	4	589	8
Pickering	5,652	479		22	112		34	53	52	14	8	937	2,184	287	28		13	6	592	74	33	674	36
Scarborough	3,203	504	4	12	159	36		16	20	52	32	573	672	122				63	439	12	14	539	128
Uxbridge	4,737	236	16		225	172	139	11	8	62	66	1,999	832	40		38	6	57	591	42	15	176	
Vaughan	64	8										28							28				
Whitchurch	1,909	270			70	32	6		40		8	401	600	8			4		257	10	6	191	
Total	18,332	1,850	20	34	566	240	205	91	197	128	188	4,704	4,859	545	28	38	23	134	2,083	140	72	1,969	172
Per Cent	100	10.1	0.1	0.2	3.1	1.3	1.1	0.5	1.1	0.7	1.0	25.7	26.5	3.0	0.1	0.3	0.1	0.7	11.3	0.8	0.4	10.7	1.0

Six other types occur as traces each constituting less than 0.1 per cent of the woodland. These are: -

Type 14a	=	6 Acres	Type 47	=	2 Acres
" 15	=	6 Acres	" 59	=	12 Acres
" 25	=	12 Acres	" MAm	=	8 Acres



Overcrowding slows growth. A thinning to favour the better stems would speed the development of quality material.



White cedar, which occupies land too wet for agriculture, is now the most common cover type on the watershed.



Sugar maple and beech - sugar maple stands once occupied most of the better soils and are still of major importance as farm woodlots.

- Type 50 - White oak, occurs on the dry sandhills in the north-east corner of the watershed.
- Type 51 - Red oak - basswood - white ash, contains a greater variety of species and grows on somewhat moister sites.
- Type 52 - Red oak, occurs mainly on the valley slopes in Scarborough and the rough hills of Uxbridge Township.
- Type 58 - Beech, as a pure type is scattered in small areas through the watershed.
- Type 59 - Ash - hickory is a residual type which often occurs after logging and grazing of Type 60 stands.
- Type 60 - White elm - silver maple, occurs in river bottoms and on swampy depressions in rolling plains.
- Type 88 - Willow, occurs on wet sites along stream banks.
- Type MAM- Manitoba Maple, occurs on bottomland in the lower Rouge Valley.

Summary of Cover Types

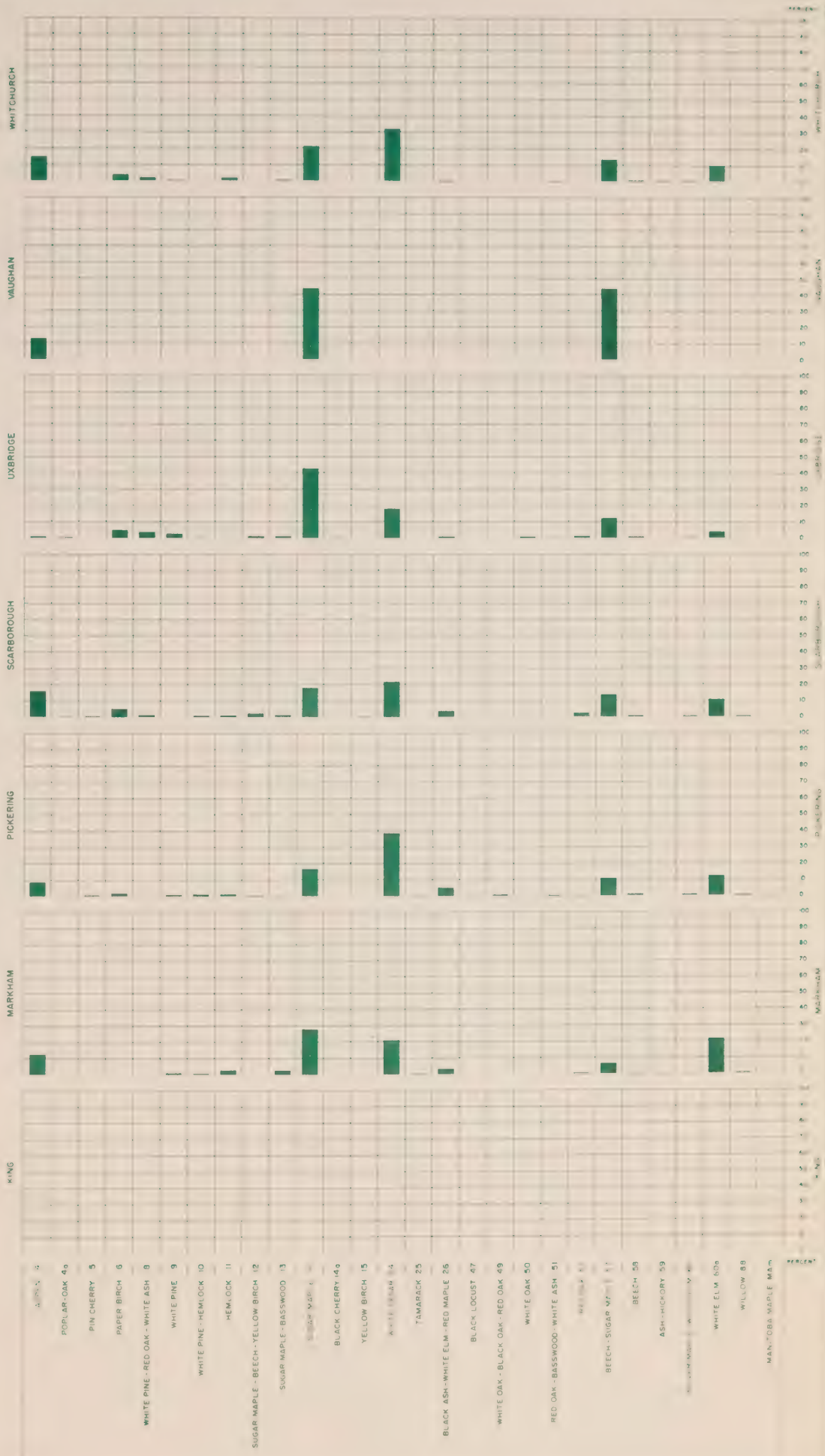
(a) The upland areas of the R.D.H.P. Watersheds are generally characterized by sugar maple and beech - sugar maple stands which are the common climax type for the Great Lakes - St. Lawrence Forest Region. These types make up 37 per cent of the total woodland of the watersheds. These cover types once extended over most of the upland areas. As they occupied the most desirable agricultural land, a large proportion of these stands were cleared.

(b) Aspen, which is a temporary type of low commercial value, now occupies 10.1 per cent of the woodland due to clear-cutting, or other opening up of the forest. Much of this area could be occupied by more valuable forest species.

(c) The other common types are characteristic of swamp areas. White cedar and elm swamps produce a forest crop

FOREST COVER TYPES BY TOWNSHIPS

PERCENTAGE BY TOWNSHIP
1954



on lands not suited for other use, and at the same time form valuable water storage areas.

(d) The twenty-three cover types making up the remaining 16 per cent of the forest cover indicate the great variety of local climatic, topographic and soil conditions found in the R.D.H.P. Watersheds.

3. Condition of Woodlands

Conditions revealed by the survey are shown in some detail in the accompanying tables and graphs.

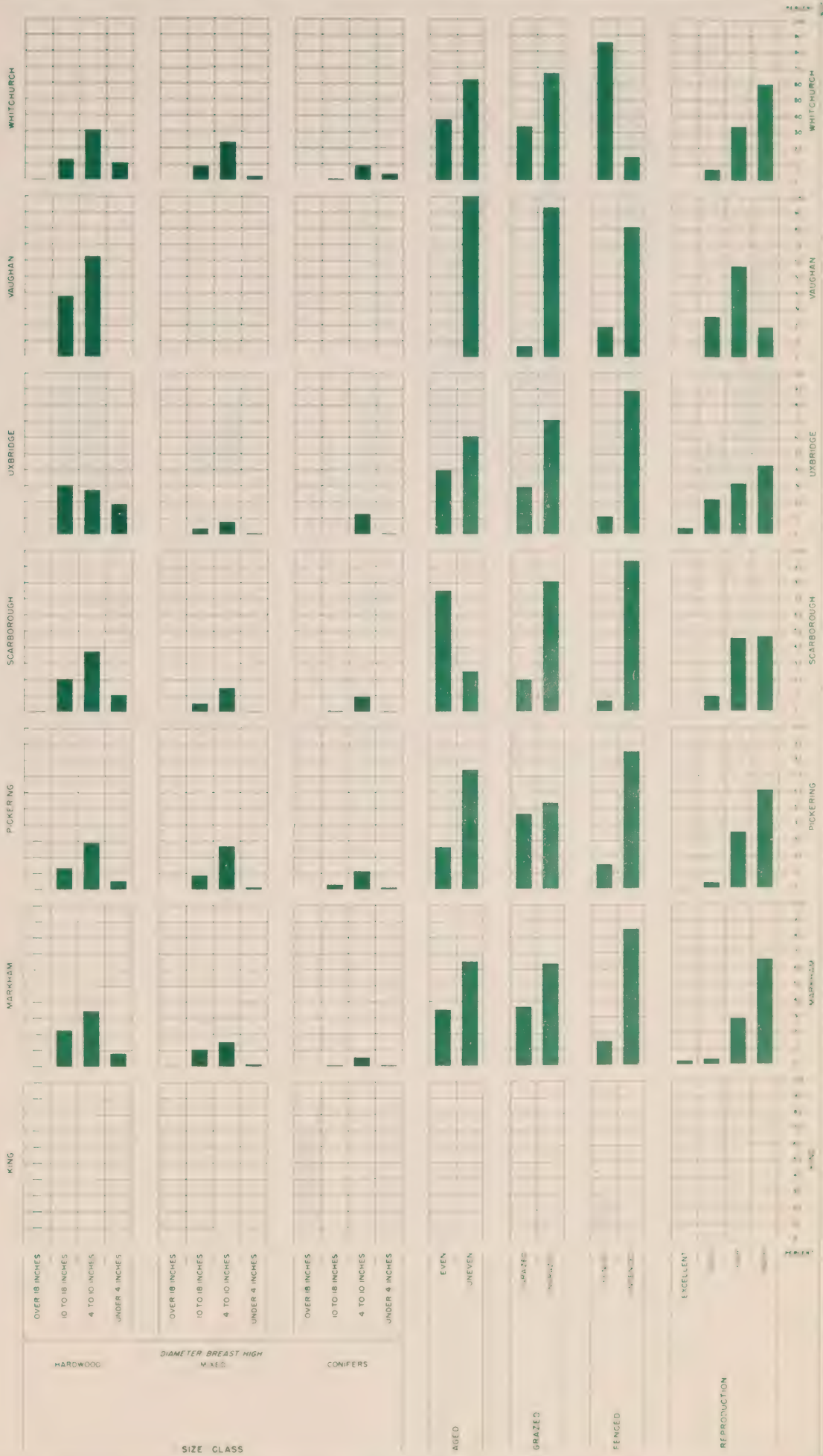
Woodland within the watersheds comprises 18,332 acres, which is 9.3 per cent of the total area of 197,071 acres. Of this woodland, 62.1 per cent is classed as hardwood stands, 25.6 per cent as mixedwood, and only 12.3 per cent as coniferous. This indicates that even the cedar type has a considerable admixture of swamp hardwoods. As upland conifers and mixedwood types are relatively limited, the supply of softwood sawlogs from the area is very small.

Very little of the present woodland is mature and merchantable. Only 0.3 per cent, practically all hardwood, is classed as over 18 inches diameter breast height. Coniferous stands between 10 and 18 inches, the size desired for posts and poles, make up only 1.1 per cent. The 12.5 per cent of young stands, under 4 inches diameter breast height, and the 31.1 per cent hardwoods between 4 and 10 inches will require some time to grow to merchantable size. This time may be shortened by thinning the stands where necessary. The remaining hardwoods between 10 and 18 inches diameter (20.3 per cent), mixedwood from 4 to 18 inches (24.4 per cent) and conifers 4 to 10 inches (10.3 per cent) will soon reach maturity and should pay for proper management in a relatively short time.

The survey indicates that 68.3 per cent of the woodland is uneven-aged, and therefore might readily become a source of continuous revenue to the owner. However, this continuous production will not last for long unless there is

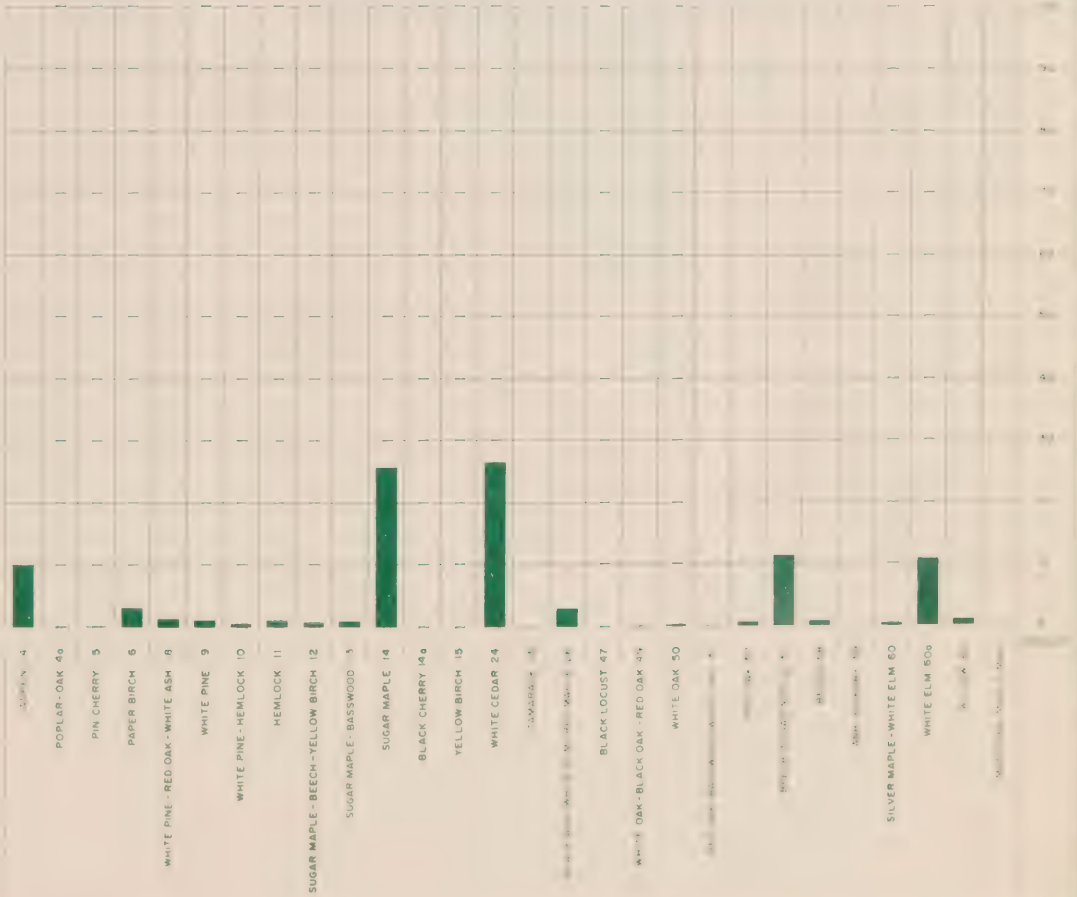
WOODLAND CONDITIONS BY TOWNSHIPS

PERCENTAGE BY TOWNSHIP
1954



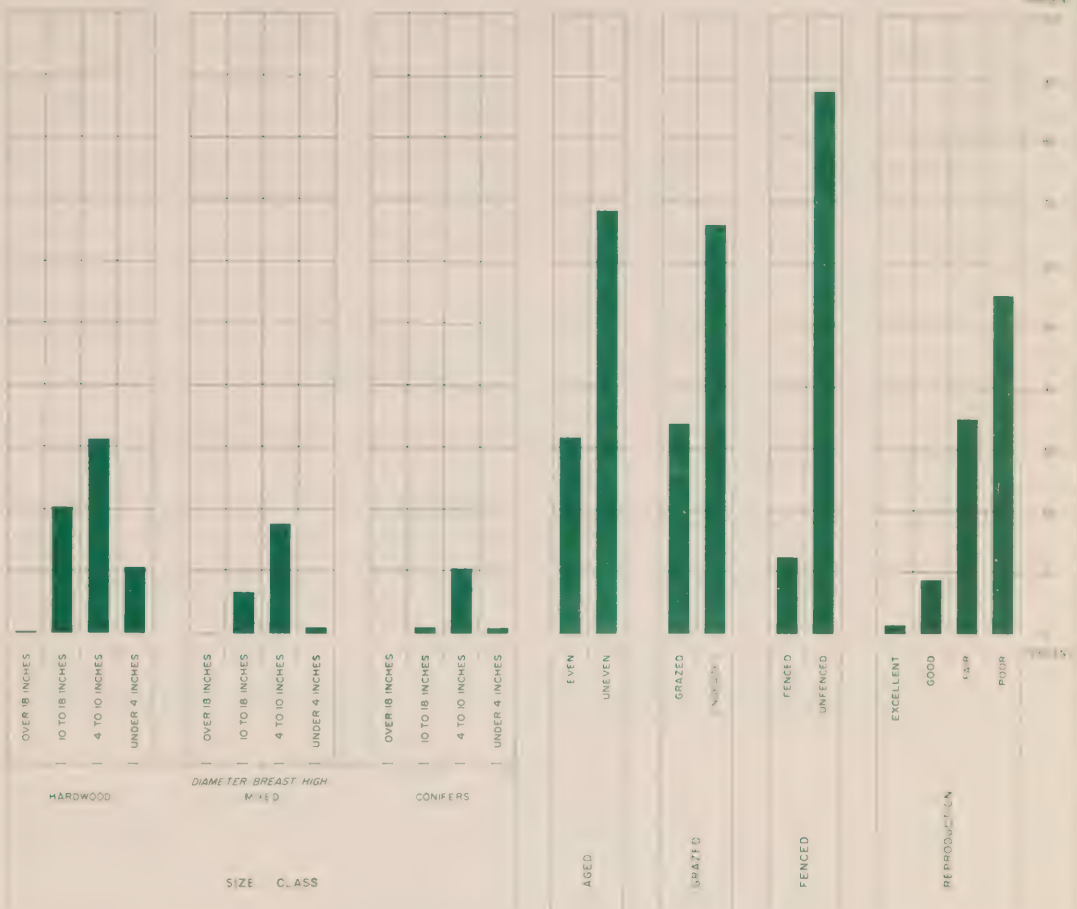
FOREST COVER TYPES

PERCENTAGE OF TOTAL WOODLAND
1954



WOODLAND CONDITIONS

PERCENTAGE OF TOTAL WOODLAND
1954



an improvement in natural regeneration in the woodlots. Over half the woodland area shows virtually no regeneration. Only 10.0 per cent shows regeneration which can be classed as "good" to "excellent". One obvious reason for this condition is the fact that the majority of the woodlots are not fenced from cattle.

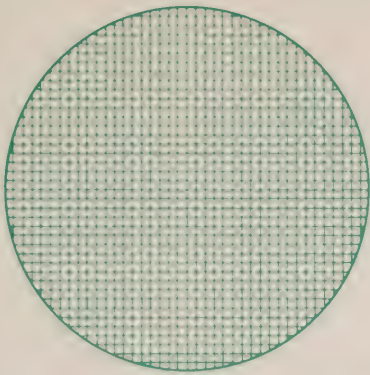
4. Scrublands

In all, 1,205 acres in these watersheds are covered with tree species which never attain commercial size. The most common species are scrub willow and dogwood on poorly drained sites and hawthorn and sumach on dry sites. Most of this land is in small patches not suitable for public acquisition and must be the concern of the individual landowner.

In some cases this land can be restored through drainage or through eradication of dry scrub. However, where such restoration does not seem economically feasible, the area should be returned to tree cover through systematic replacement of the scrub species with more valuable species.

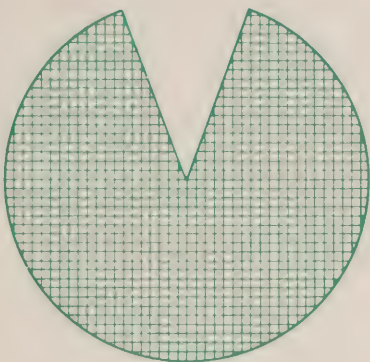
SCRUBLANDS

Township	Area in Watershed (Acres)	Scrub			
		Dry (Acres)	Wet (Acres)	Total (Acres)	Total % of Twp. Area
King	346	---	---	---	0.0
Markham	59,386	89	144	233	0.4
Pickering	58,426	421	148	569	1.0
Scarborough	33,370	96	87	183	0.5
Uxbridge	24,672	---	108	108	0.4
Vaughan	1,133	---	---	---	0.0
Whitchurch	19,738	---	112	112	0.6
Total	197,071	606	599	1,205	0.6



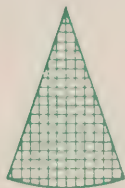
TOTAL AREA OF WATERSHED

197,071 Acres
(100 %)



OPEN LAND AND URBAN AREAS

175,199 Acres
(88.9 %)



NATURAL WOODLAND AND PLANTATION

20,667 Acres
(10.5 %)



WET SCRUB

599 Acres
(0.3 %)



DRY SCRUB

606 Acres
(0.3 %)

CHAPTER 3

MARKETS AND MARKETING

Decreasing wood supplies have resulted in the disappearance of local sawmills which formerly dotted the R.D.H.P. area. There are many wood-using industries in the Toronto area which use species grown in these watersheds, but even these often find it more convenient to buy supplies in carload lots from other regions rather than shop for meagre local supplies. In the absence of assured local markets, woodlot owners are discouraged in caring for the remaining woodland, thus further reducing wood supplies and exaggerating poor market conditions.

This trend can be reversed. Improvement of woodlots and planting of unproductive areas are obvious means of increasing production which are discussed in later chapters. In addition any woodlot owner should know enough about harvesting and marketing his products to get the most out of his present production.

1. The Timber Harvest

Harvesting of timber involves four operations: estimation of volume, cutting, skidding and hauling. The owner may perform all operations, selling his logs at the mill; he may cut and skid the logs, selling them at the roadside; or he may sell his timber on the stump.

(a) Estimating

Estimation of timber may be done either in the tree (cruising) or in the log after cutting (scaling).

Some operators cruise timber by rough ocular estimate; that is, by walking through the bush and estimating, on the basis of past experience, the number of board feet in the stand. The most accurate method would be to measure each tree, consider taper and defect, estimate and tally its volume.

In large wooded tracts only a representative sample, say 10 per cent or 20 per cent, may be measured, and the total estimated from this sample.

One example may illustrate the value of a tallied cruise. Some years ago in competitive bidding for 87 acres of woodland one operator estimated a stand, by tallying every merchantable tree, to be 700,000 board feet; the chief log buyer for a large furniture manufacturer estimated 350,000 board feet; another operator estimated 100,000 board feet. The actual cut from the stand was 746,000 board feet. Obviously such discrepancies are of concern to the seller as well as to the bidder who tries to maintain his place in competitive buying. Before selling standing timber it would pay the owner to make a tallied cruise or, if necessary, to hire professional assistance for this purpose.

Similarly when selling logs the owner or his agent should assist in their measurement, try to understand the allowance which must be made for defects, and assure himself that he is being fairly treated.

(b) Cutting and Skidding

In a typical hardwood operation the value of logs at the roadside may be half as much again as that of logs in the standing tree. The difference is mainly labour cost.

By performing the operations of cutting and skidding the farmer increases his return by selling his labour and use of his equipment instead of just his stumpage. The flexibility of woods work in fitting into otherwise slack seasons on the farm should make this increased return particularly attractive. In addition, the farmer doing his own cutting is best able to determine that the right trees are removed and damage to the remaining stand kept as low as possible.

(c) Hauling

Truck hauling has increased the distance from which mills can secure their logs. Cost per thousand board feet hauled depends largely on distance. Thus, while grade 1 logs might be hauled up to 50 miles, the lower value of other logs might limit practical hauling distance to 15 or 20 miles.

While actual figures will vary greatly, the example below will suggest the change in log value at various stages.

Value of logs in the tree (stumpage)	\$28.00	per	M	bd.	ft.
Making logs from tree	8.00	"	"	"	"
Skidding logs to road	6.00	"	"	"	"
Hauling logs to mill	8.00	"	"	"	"

Value of logs in millyard	\$50.00	per	M	bd.	ft.
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2. Timber Sales

(a) Outright Sale of Woodlot

Frequently a saw-miller finds the simplest procedure is to buy the woodlot or farm outright. In this case the former owner has no further interest in the land. The practice of slashing such woodlots and leaving them to become tax-delinquent was legitimate cause for community concern. Where tree cutting by-laws are rigidly enforced this abuse should be kept under control.

(b) Sale of Cutting Rights

Under this method the owner sells the right to cut all timber of certain species down to a certain diameter; or the trees to be cut may be marked in advance and the sale made on this basis. Often only a very vague word-of-mouth agreement is made and misunderstandings are common. A simple written agreement such as that suggested later in this chapter would avoid this confusion.

A lump sum method of payment is often used on such sales, based upon a volume estimate by the buyer. As mentioned in the section on cruising, the volume estimates of

different bidders may vary considerably. The seller is therefore advised to consult the list of buyers of woodland products in the hands of the Zone Foresters and to obtain competitive bids from as many buyers as possible. On lump sum purchases the buyer takes all the risk as to accuracy of estimate and quality of timber.

Selling the standing timber at a rate per thousand feet removes the uncertainty of volume estimates and requires measurement of the logs after cutting. Two uncertainties remain, the log rule to be used in measurement and the assignment of logs to different grades which differ in prices per thousand board feet. For provincial government transactions the new Ontario log rule is now required; but for private sales there is no set standard, the Doyle rule being most commonly used. The woodlot owner seldom knows the problems of processing logs into lumber sufficiently well to understand fully why the buyer assigns some logs to lower grades. Publication of price lists and grade specifications by log buyers would promote better relations with woodlot owners. Possible arguments and ill-feeling over these matters are factors in making some buyers prefer lump-sum purchase. The woodlot owner must decide whether to accept volume and grade risks in the hope of getting a better price by selling on a log measurement basis.

In the event that he chooses to be paid on a volume-removed basis, just what the buyer intends to cut and pay for should be absolutely clear. Only the best trees might be removed and it is possible that only the best logs from these trees might be taken. This leaves the owner with many poor quality logs which he cannot readily sell and with some poor trees standing which he wanted cut. The volume actually paid for might be small and the woodlot owner's total realization on the transaction might be less than he would have received had he accepted payment in a lump sum.

No matter which of these two methods is chosen, a written Timber Sale Contract should cover the transaction. It should set forth all the details necessary as to prices, species, sizes, rights granted to the buyers, limiting dates, times of payment, and so on.

(c) Owner-Made Logs

The woodlot owner who has decided to realize not only the value of his woodland product but also the additional labour income derived from its harvest prefers to take payment at a price per thousand board feet for logs placed on skids at the roadway or logs delivered to the mill. Here again the securing of competitive bids and a clear understanding with the buyer regarding log grade will avoid any feeling of unfairness in the deal. An owner who simply arrives at the mill with a load of logs may feel that he has to accept the offered price even though he is dissatisfied.

3. Timber Sale Contracts

As an aid to people who are unfamiliar with timber sale agreements, a sample contract is given here. It shows the more important provisions that should be included in a contract for the sale of marked trees to be scaled in the log. Substitute clauses are given for use in other kinds of sales. No single form of contract will suit all classes of sales, but owners of woodland timber should have no difficulty in adapting this contract to their use.

SAMPLE TIMBER SALE CONTRACT

Agreement entered into on this.....day of.....
between.....of.....
hereinafter called the seller, and.....of
.....hereinafter called the purchaser.

Witnesseth:

ARTICLE I. The seller agrees to sell the purchaser, upon the terms and conditions hereinafter stated, all the living

timber marked or designated by the seller and all the merchantable dead timber, standing or down, estimated to be..... board feet, more or less, on Lot.....Con.....in the Township of.....County of.....and located on a farm owned by the seller and about.....miles from.....

ARTICLE II. The purchaser agrees to pay the seller the sum of.....more or less, as may be determined by the actual scale, at the rate of..... per thousand feet..... payable prior to the date of removal of material, in installments of.....each.

ARTICLE III. The purchaser further agrees to cut and remove said timber in strict accordance with the following conditions:

1. Unless an extension of time is granted, all timber shall be cut, paid for, and removed on or before.....

2. Saw timber shall be scaled by the..... log rule, and measured at the.....

3. The maximum scaling lengths of logs shall be 16 feet; greater lengths shall be scaled as two or more logs. Upon all logs an additional length of 4 inches shall be allowed for trimming. Logs overrunning this allowance shall be scaled not to exceed the next foot in length.

4. No unmarked timber of any kind shall be cut, except.....

5. Stumps shall be cut so as to cause the least possible waste - stumps of trees up to 16 inches in diameter, not higher than 12 inches above the ground, and those of trees above this size at a distance above the ground not greater than three-fourths of their diameter.

6. All trees shall be utilized in their tops to the lowest possible diameter, for commercially saleable material.

7. Young trees shall be protected against unnecessary injury; only dead trees and less valuable kinds may be used for construction purposes in connection with lumbering operations.

8. Care shall be exercised at all times by the purchaser and his employees against starting and spreading of fire.

ARTICLE IV. It is mutually understood and agreed by and between the parties heretofore mentioned as follows:

1. All timber included in this agreement shall remain the property of the seller until paid for in full.

2. In case of dispute over the terms of this contract, final decision shall rest with a reputable person to be mutually agreed upon by parties to this contract, and in case of further disagreement, with an arbitration board of three persons, one to be selected by each party to this contract, and a third to be the Zone Forester or his chosen representative.

In witness whereof the parties hereto have hereunto set their hands and seal this..... day of.....19.....

Witnesses:

.....
.....

The following are sample clauses that should be substituted in the contract when other methods of sale are used. In lump sum sales, substitute in Article I a descriptive clause modelled on this one:

All merchantable living trees, except.....
.....which measure 12 inches or less in diameter at breast height (a height of $4\frac{1}{2}$ feet above the ground).

Such provision will reserve the basis of a second crop consisting of the more valuable and rapid-growing

kinds of trees and remove all the inferior and slower-growing trees.

The payment clause in lump sum sales should be varied to read somewhat like this:

The sum of.....dollars.....for said timber, payable prior to the cutting of the material, in instalments of.....dollars.....each, payable on or before.....,respectively.

4. Attempts at a Solution of the Marketing Problem

Orderly marketing of woodland products is to the advantage of the woodlot owner, the sawmill operator, and the ultimate industrial consumer who requires definite quantities of certain species in certain grades to carry on his manufacturing business. It has already been remarked that the farmer feels at a disadvantage in marketing logs, and his real or imagined grievances are a detriment to good relations between the buyer and seller of logs and a steady flow of logs to the market. The following attempts at improved marketing may suggest methods which could be applied in the R.D.H.P. Watersheds.

(a) A Marketing Experiment near Doon

During the winter season of 1948 and 1949 the Department of Lands and Forests in the Galt Zone carried out an experiment in the marking and marketing of timber in an 18-acre woodlot near Doon. The project was initiated by Mr. I. C. Marritt, the District Forester, and the field work was done by Mr. L. S. Hamilton, Zone Forester. The scheme is patterned after a marketing assistance method meeting good success in the State of New Jersey.

The mixed uneven-aged woodlot contained considerable large white pine and red oak. Initial investigations by the Department showed growth stagnation due to over-stocking and recommended the removal of certain trees representing the accumulation of growth over a number of years. Under this

condition, removal of selected trees reduces the growth stagnation factor and the remaining trees grow at an increased rate. As growth again slows down, another cropping should take place. This is the simple principle of selective logging - the removal of accumulated growth periodically to keep the stand at a healthy productive growth rate.

Upon explanation of the proposed marketing assistance, the woodlot owner entered into a signed agreement with the Department as a co-operator, agreeing not to sell or allow to be cut any trees except those marked, upon penalty of a nominal fine per thousand for the estimating and marking service of the Department.

The trees were marked with a view to a second marking which would be necessary afterwards to remove weed trees and trees of low value in order to give good growing conditions. Each tree marked for removal was blazed at breast height and below stump height, the stump blaze being branded to detect any unauthorized cutting. The total log scale estimated for the 223 trees marked was 47,600 board feet Doyle Rule. The trees were listed as to species and diameter on a mimeographed form.

All the estimation data were turned over to a timber agent chosen by the Department. The timber agent entered into written agreement with the owner to

- (1) solicit tenders from buyers;
- (2) draw up a timber sale contract protecting the owner;
- (3) check on cutting operations; and
- (4) measure and collect payment for all wood cut before its removal from the property.

The agent was to receive a percentage commission of the gross sale value.

The timber agent mailed the volume estimate sheets to all local log buyers, giving location of the woodlot and inviting inspection of the bush.

The timber sale contract set forth the prices agreed upon for the different species, required that tops be worked into 4-foot wood to be paid for at an agreed price per standard cord, provided penalties for the cutting of unmarked trees, and required that the woods operation be conducted with a minimum of damage to the woodlot.

Prices realized by the owner were much better than the average paid in the area. Prices per thousand board feet Doyle Rule for the standing timber were:

White and red oak.....	\$62
White ash, soft maple, hard maple, basswood and cherry.....	\$60
White pine.....	\$55
Hemlock.....	\$45
Beech.....	\$30
Fuelwood.....	\$4 per standard cord

The experiment was considered very successful by all the parties concerned, yielding about 2,000 board feet more than estimated, and the woodlot has been left in fine growing condition with an expected second cut in fifteen or twenty years of 25,000 board feet.

(b) The Lanark County Co-operative

This Co-operative was set up by a group of woodland owners in the County of Lanark in March 1950. Its objectives are the better management of privately owned woodland to ensure a continuous yield of the best material possible from the forested land of the members through profitable marketing of all the woodland products.

To put the woodland enterprise on a paying basis to the individual it is necessary to market not only the material suitable for lumber manufacture and special products such as veneer, but also the inferior products such as the poorer hardwood species, low-grade hardwood logs of the better species, small softwood products such as cedar posts and poles,

and that material removed in improving a woodlot during what may be called sanitation cutting. It was felt that the advantages of co-operative action by woodland owners in the field of marketing would best solve the problems of the individual, particularly in respect to inferior or small products. Acting as a group rather than individually and through a member active in contacting prospective buyers, they can hope for recognition by the buyers in the area as a stable source of the various woodland products.

The establishment of the Co-operative followed an extensive educational campaign carried on by fieldmen of the Federation of Agriculture, the Department of Lands and Forests, and the local Farm Forum leader. Interest was aroused through moving-pictures, talks at schools, local evening meetings, press releases, radio programs and public speaking competitions on woodlot management. Meetings held at Lanark were attended by officers of the Department of Lands and Forests, representatives of pulp and paper companies, sawmills, and other wood-using industries, and members of agricultural organizations. Gradually a workable plan was evolved and the Lanark Forest Co-operative was set up under a number of directors with Mr. Herb Paul as manager.

Mr. Paul of Lavant, the main force behind the formation of the Co-operative, is an energetic leader of the local Farm Forum, caretaker of the Lanark County Forest, a farmer and owner of several hundred acres of woodland in Lavant Township. As manager of the Co-operative his duties entail the location of markets for the woodland products of the members, arriving at satisfactory price schedules, collection of payment for products, ensuring that products are ready or delivered at the time promised, and advising members on cutting their woodland according to best forestry practices.

By the fall of 1950 membership in the Co-operative was approximately 60, with an increasing interest in its

operations prevalent. The membership fee is \$5 and in addition the Co-operative takes 5 per cent of the sale proceeds of products handled. The member pledges to supply the quantity of material at the time and place agreed and to practise woodlot management according to conservation principles.

At present the Co-operative has no intention of undertaking a manufacturing endeavour such as a sawmill for lumber or railway ties. Logs are not accumulated at a central point and sorted as to species and a grading standard, but are handled direct from woodland to buyer. The purchaser's measure of the volume, by grade where it might apply, is accepted as the basis for payment on transactions.

An objective of the Co-operative, stated as the better management of privately owned woodland to ensure a continuous yield of the best material possible, is a highly commendable aim. However, the statement entails a tremendous amount of field work on the part of those capable of advising on the subject of woodlot management. This is a job requiring experienced field personnel. At present, although the Department of Lands and Forests is following this development in marketing with interest and co-operation, it has not the staff of extension foresters to provide the many owners of farm woodland with the guidance that is necessary. If the farm woodlot is to assume its place in the economics of the farming enterprise it must be shown that it pays in dollars and cents to the owner. The average woodlot owner cannot afford to carry on practices at a financial loss in the interest of the region or posterity. If, in its infancy, the Co-operative manages to make money for its members by the sale of those products generally difficult to market as well as those relatively easy to market, and does the best it can toward field guidance on woodlot management for perpetual yield, then it will have done a lot toward good forestry in its area.

CHAPTER 4

FOREST CONSERVATION MEASURES IN PROGRESS

Forest conservation measures are most common on the rough hills and valley slopes of the north and eastern sections of the R.D.H.P. area, but interest and some activity were widespread throughout the watersheds. Near Lake Ontario the rapidly increasing urbanization prevents any extensive forest development in areas which might otherwise be suitable for this purpose.

1. Demonstration Woodlots

The most important measure which could be taken for forest conservation would be the improved management of present woodlots. An early effort in this direction was the establishment by the Department of Lands and Forests of demonstration woodlots. These are areas of private woodland on which the owners have agreed to follow prescribed methods of woodlot management and to permit access to the area by interested persons. A number of demonstration woodlots were established in the R.D.H.P. Watersheds.

Well conducted demonstrations could exert an influence for proper management in the surrounding area. Unfortunately, some of these demonstration woodlots have been cut over when the property changed hands, and others have been neglected so that they no longer serve their original purpose.

2. Demonstration Plantations

In 1922 the Provincial Government began the policy of assisting municipalities in the establishment of small forest plantations for the purpose of demonstrating the use of trees on marginal and submarginal land. To meet the requirements for such a plot the Government required that the area be on a well-travelled road so that as many people as possible could see it; that the municipality either purchase land or use land which was in its possession, fence it, and agree to give the area reasonable protection after planting.

In return the Government agreed to supply the trees and pay the cost of planting and of supervising the work when the planting was in progress. Unionville and the Village of Markham established small demonstration plantations in 1929 and 1931 respectively.

3. Private Planting

In the R.D.H.P. Watersheds there are 2,024 acres in private plantation, distributed as follows:

Township	Area of Plantation in acres	Per Cent of Twp. Area
King	12	3.5
Markham	138	0.2
Pickering	144	0.2
Scarborough	54	0.2
Uxbridge	1,640	6.6
Vaughan	-	-
Whitchurch	36	0.2
Total	2,024	1.0

This is a worthwhile start in reforestation and in Uxbridge Township represents an appreciable addition to the forest area.

The graph of private planting progress which follows this page shows a marked increase in activity in recent years. Private individuals and municipalities may obtain advice and assistance in reforestation and woodlot management through the Department of Lands and Forests' Zone Forester at Maple. The Zone Forester also assists in the establishment of Authority forests, County forests, demonstration and school plots.

The forest tree nurseries at St. Williams, Midhurst and Orono are the chief sources of planting stock for this area.



This thinning has meant revenue in the form of pulpwood removed and allows the remaining trees to increase more rapidly in diameter.



Pruning to improve timber quality also provides access for fire protection and other work in this private plantation



Branches near knots and lower grade timber

Survival and growth of seedlings have been good except in some of the more difficult blow sand areas. Recent insect damage has caused some concern.

Few owners are interested solely in production of Christmas trees. However, in many plantations intended to produce a more permanent forest cover some Christmas trees are grown. These give an early return and help to defray the planting cost.

4. County Forests

Undoubtedly much of the interest in private reforestation is a result of the success of the York County Forest, established in 1924, and the Ontario County Forest, established in 1926. All of the York County Forest is north of the R.D.H.P. area but 311 acres of the Ontario County Forest in Uxbridge Township fall within the Authority boundary.

The first county forest in the Province of Ontario was established in 1922. The agreements which are in force at the present time run for a period of 30 years, during which time the Ontario Government agrees to establish the forest and pay the cost of such items as fencing, buildings, equipment, labour, maintenance, trees, etc. - in short, everything connected with the management of the forest.

At the end of the 30-year period the County has the privilege of exercising one of three options: First, to take the forest over from the Government and pay back the cost of establishment and maintenance without interest; second, to relinquish all claim to the forest, whereupon the Government will pay to the County the cost of the land without interest; third, the forest may be carried on as a joint undertaking by the Province and the County, each sharing half of the cost and half of the profits.

For eight years now sales of thinnings from the Uxbridge Forest for pulpwood and mine props have helped to pay the cost of improving these plantations.

5. Tree-Cutting By-Laws

Under The Trees Conservation Act of 1946 and its successor The Trees Act (R.S.O. 1950, c.399) twenty-one counties have passed by-laws to restrict and regulate the cutting of trees. These by-laws do not interfere with the right of the owner to cut material for his own domestic use, but specify certain diameters below which trees may not be cut for sale. In York County the minimum diameter is 14 inches, measured eighteen inches above ground. At the present time the County of Ontario has no regulations restricting the cutting of trees and woodlots are being ruthlessly destroyed, the more so because this is prohibited in adjacent counties. One of the prime objectives of the Authority should be to have a Tree Cutting By-Law passed in Ontario County. Excluded from this restriction are a number of species which are less important or undesirable, or are commonly used in smaller sizes:- Hawthorn, choke cherry, red or pin cherry, poplar, ironwood, Manitoba maple, wild apple, black locust, cedar, tamarack, white birch, willow.

In general diameter limits are too low, and greater uniformity between counties would be desirable.

Such diameter limits are only an elementary step to prevent indiscriminate slashing of woodlands. Where these by-laws have been enforced rigidly they have proved of considerable benefit. There will, however, usually be fast-growing trees above the diameter limit which are increasing rapidly in value, and should be left for future cutting. There will also be poorly formed or diseased trees below the diameter limit which should be removed.

Better than a rigid diameter limit is the marking of trees for cutting according to their condition. Professional advice on such marking is available through the Zone Forester. Many tree cutting by-laws provide for the necessary variations from a strict diameter limit where the cutting is done under such supervision and in accordance with good forestry practice.

6. 4-H Clubs

These clubs are organized by the Ontario Department of Agriculture assisted by the Department of Lands and Forests and must be sponsored by an organization interested in the improvement of woodland and reforestation.

Members must be between 12 and 21 years of age and each member undertakes a project such as marking a half-acre plot of woodland for thinning or reforesting a quarter-acre of land. Projects are judged annually on Achievement Day and prizes awarded; for this purpose the Department of Agriculture furnishes \$3.00 per member and the sponsoring organization \$1.50. Winners may enter the Provincial Inter-Forestry Club Competition. A club serving some of the students of the R.D.H.P. area has been operating in Pickering for the past few years.

Sponsorship of these clubs in the R.D.H.P. Watersheds would be a worthwhile project for the Authority.

7. Tree Farms

In the past few years a movement has been under way to recognize well-managed forest properties as Certified Tree Farms. With the sponsorship of several organizations interested in better forestry, the Canadian Forestry Association in 1953 formed a National Tree Farm Committee to recognize with a suitable sign and certificate those owners who agree to maintain their land for growing forest crops, protect the land adequately, agree that cutting practices will be satisfactory to ensure future forest crops, and permit inspection by Committee foresters. A Committee has now been set up for the Simcoe District which includes the R.D.H.P. area.

Several Conservation Authorities have become co-sponsors of the Tree Farm movement in their areas, and it is recommended that the R.D.H.P. Conservation Authority give its support to this movement.

CHAPTER 5

FOREST CONSERVATION MEASURES REQUIRED

The activities through which the Authority may further forest conservation fall into three broad categories. In woodlot improvement demonstrations or private planting the Authority may co-operate with private landowners. In large areas needing reforestation or management the Authority may acquire land and manage it directly. Through public meetings, field days and publications the Authority may educate and encourage residents of the R.D.H.P. Watersheds to practise conservation on their own lands.

1. Woodlot Improvement Projects

For most persons the best lesson in conservation is field observation of specific examples of the present abuses and efforts to remedy them. Woodlots chosen as illustrations must be near good roads and should be marked with large signs giving considerable detail of conditions and improvement measures in progress. Roadside or other parking facilities would have to be provided so that visitors could take the full time necessary for inspection without interfering with other traffic.

Some of the proposed improvements are experimental in nature. From the owner's point of view the whole program may seem to be of unproved value. On these sample areas the Conservation Authority is therefore fully justified in assuming part of the actual woodlot improvement cost as well as the cost of signs and parking facilities.

To use a private woodlot in this way for educational purposes would require a definite agreement with the owner to ensure that the proposed improvements would be carried out, and that the benefits of this work would not be lost by a change of ownership or attitude on the owner's part. In addition a detailed record of costs and returns would be necessary to show other owners that it would pay for them to adopt similar practices in their own woodlots.

Some owners may be willing to see their woodlots used for such demonstrations, but wish to be relieved of any personal participation in the project. In such cases the Authority might lease the woodlot or purchase it outright.

Below are listed a few examples of well-located woodlots in the most common upland cover types which would make good woodlot improvement projects. The Conservation Authority should decide on suitable forms of agreements, leases, etc., explain the purpose of these projects to the owners and try to enlist them as co-operators. This list is by no means exhaustive, but serves to illustrate the type of woodlot suitable for such projects.

- (1) Lot 19, Con. V, Uxbridge Township
3 miles north-east of Goodwood

Mostly hard maple with rather poor hemlock and formerly some good white pine which has now been cut. The larger remaining trees are overmature and defective and should be removed. Planting of open spots could bring white pine back into the stand. Well stocked areas of young growth will later need thinning.

- (2) Lot 15, Con. III, Uxbridge Township
1 mile east of Goodwood

Mostly hard maple, lacking regeneration due to heavy grazing. Cattle should be excluded and open areas either planted or broken up to encourage natural regeneration. Some dense young parts of the stand need immediate thinning and the older portion needs defective trees removed.

- (3) Lot 15, Con. VI, Markham Township
2 miles north-east of Unionville

A former demonstration woodlot, not grazed, had some thinning and planting twenty years ago. Many trees which are poorly formed, diseased, or of inferior species should now be taken out in another thinning.



Private planting has followed the county example. This young pine plantation adjoins a county tract.



On unprotected land, water carves gullies and spreads sterile sand on fields below.



Stones and scrub growth make reforestation the wisest use for this land.

(4) Lot 1, Con. IX, Markham Township
4 miles south-east of Markham

Beech - hard maple type with ash, white pine and basswood. This stand is approaching maturity but fall pasturing has kept down reproduction and allowed invasion of undesirable ironwood. The main requirements are fencing to exclude cattle, removal of weed trees and selective cutting of the main stand as trees mature.

2. Private Reforestation

On many farms, even in the better farming areas, there are small tracts which, because of steep slopes, stoniness or poor drainage, would be better in tree cover. A total of 5,852 acres of such land requiring private reforestation were mapped in the recent survey. These tracts are not suitable for public acquisition and management, but the effect of reforestation on control of run-off, improved summer stream flow and stabilization of the wood-using industry justifies public assistance in such work. These areas have not been privately reforested heretofore because the owner has some other minor use for the area, because he is discouraged by the long period between planting and harvest of a forest crop, or more commonly simply because of inertia on his part.

The interest of private owners in reforestation may be fostered in several ways. Public education, such as that now carried out by the Zone Forester in the district, can be furthered by the Authority. In addition, direct assistance to private planting can be given.

The Authority has already purchased a tree-planter for the use of private planters. Some Authorities also supply a crew to operate the planter at nominal cost and, where rough ground makes hand planting necessary, will refund \$10 per acre if inspection shows that planting has been done carefully and the plantation is adequately protected from livestock.

ACRES
8000

7000

6000

5000

4000

3000

2000

1000

0

1914

1924

1934

1944

1954

1964

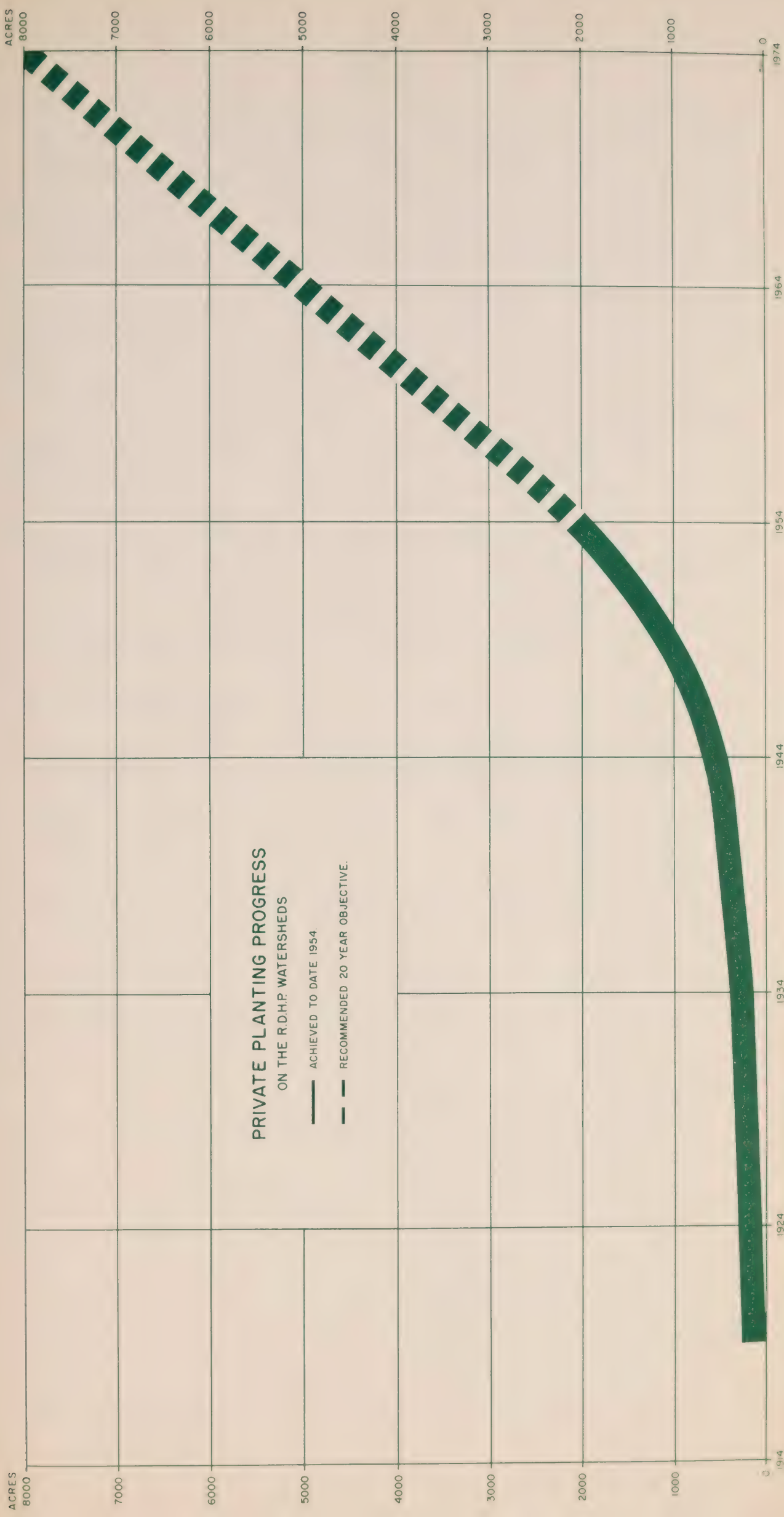
1974

PRIVATE PLANTING PROGRESS

ON THE R.D.H.P. WATERSHEDS

— ACHIEVED TO DATE 1954.

- - - RECOMMENDED 20 YEAR OBJECTIVE.



It is the policy of the Department of Lands and Forests to charge \$14 per thousand for Scotch pine and \$10 per thousand for other planting stock. For some years trees were distributed free. Following the end of the war in 1945, the nurseries were unable to meet the greatly increased demand, and it was felt that a charge for trees would ensure more care in ordering the required amount and in planting the trees received.

The assistance schemes carried out by other Authorities have stimulated interest in private reforestation while still ensuring the good use of the planting stock. It is recommended that the R.D.H.P. Authority adopt similar policies to maintain a vigorous private reforestation program. The completion of the recommended private planting as a twenty-year objective will require a sustained effort at least equal to the encouraging progress of the past few years.

3. Authority Forest

When large areas (100 acres or more) require reforestation or woodland management, the task is frequently too great for private initiative. In such cases acquisition by the Authority is recommended. This is particularly desirable where these forests form natural water-storage areas which decrease the severity of floods and maintain the summer flow of streams. Other tracts which at present lie idle or produce only sparse, droughty pasture can again be made to add to the economy of the area through reforestation.

In all 2,698 acres are recommended for acquisition by the Authority. Of this total, 1,953 acres are open lands, 649 acres have some form of tree cover, 81 acres are scrub, and 15 acres are water. A minimum of land in better land classes has been recommended for reforestation. However, it was impossible to omit such land entirely when it formed a small part of a lot which was composed mainly of a poorer type of soil. The agreements for establishment and management of Authority forests, which have been drawn up between ten Conservation

Authorities and the Ontario Government, are substantially the same as those made with the counties, except that the Government will provide half the land cost as an interest-free loan during the period of management. However, Authority lands are subject to municipal taxes. One Authority has a supplemental agreement with the Department of Lands and Forests under which it may purchase land which has existing woodland of present or potential value on it. This was arranged in order that the higher price which such woodland is worth could be paid by the Department if the purchase is approved by the Department. It is recommended that if this becomes necessary application be made by the R.D.H.P. Authority for a similar supplementary agreement.

Because of the rougher topography in the north-east section, the recommended areas are concentrated in Uxbridge and Pickering Townships. A large part of the western section is exceptionally good agricultural land, and even the poorer land near Toronto is in such demand for gravel, sand, or building sites as to make the price prohibitive for reforestation.

The problem of land acquisition should be approached carefully. In most cases purchase will be arranged by direct negotiation. The Authority has the power to expropriate land and is justified in doing so when an unreasonable attitude on the part of the owner stands in the way of works urgently required for the general good. However, a favourable public attitude is essential to the furtherance of conservation and such powers must be used with discretion. Very few of the recommended properties are occupied. In an exceptional case, if a hardship would be entailed by asking an old resident to move, some special provision such as a life tenancy of the house might be arranged.

Land prices paid by different Conservation Authorities and even within the individual Authority have varied greatly. Prices paid for the Ontario County Forest purchases in Uxbridge Township up to 1950 varied from about



The breaking of thin sod by cultivation or overgrazing starts the spreading sore of wind erosion.



Several feet of soil have gone with the wind. Even this area can be made productive by reforestation.



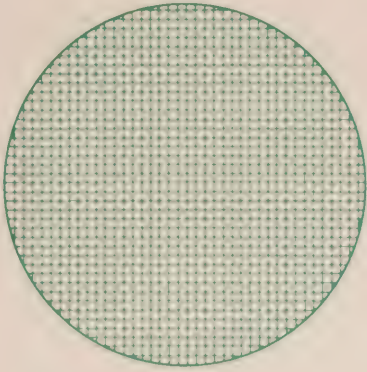
Advancing sands, if not stopped, will soon destroy adjacent farmlands.

\$7 to \$20 per acre. Since that time spreading urbanization has to some extent affected prices even this far from Toronto. The Humber Valley Conservation Authority, markedly influenced by this development, has had to pay nearly \$32 per acre for the 708 acres it has purchased for reforestation.

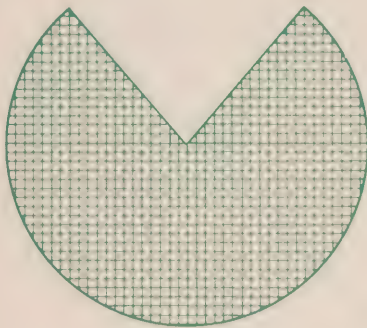
4. The Authority and Conservation Education

Many agencies at present do, or can, engage in conservation education. The Authority can supply opportunities and materials to encourage and enlarge these activities. Wall maps, literature, conservation pictures and conservation lectures supplied to the schools will help to give geography, history and conservation practices a local significance. Building up a library of slides on local conservation problems and accomplishments would be of great assistance to speakers. Organization of public meetings and contact with individuals and groups such as farm forums will gain support for both private and public conservation efforts. Landowners should be encouraged to make greater use of the services available from the Conservation Authority and from officers of the Department of Lands and Forests and the Department of Agriculture.

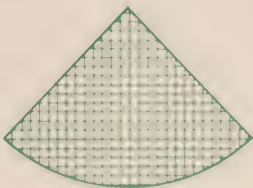
The most effective educational activity is actual participation in or field observation of conservation activities. Tree-planting days, group visits to woodlot improvement projects and conducted tours over a well organized conservation trail could all be sponsored by the Conservation Authority. These activities would all stimulate individual action on forest conservation measures, such as those described in the following chapter, which cannot be carried out directly by the Authority.



TOTAL AREA
OF
RECOMMENDED AUTHORITY FOREST
2,698 Acres
(100 %)



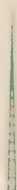
REFORESTATION LAND
1,953 Acres
(72.4 %)



WOODLAND
649 Acres
(24.0 %)



SCRUBLAND
81 Acres
(3.0 %)



WATER
15 Acres
(0.6 %)

LAND CLASSIFICATION
RECOMMENDED AUTHORITY FOREST



MUNICIPALITIES
AND
RECOMMENDED AUTHORITY FOREST
WOODLOT IMPROVEMENT PROJECTS

- LEGEND
- RECOMMENDED AUTHORITY FOREST
 - WOODLOT IMPROVEMENT PROJECTS



CHAPTER 6

FURTHER FOREST CONSERVATION MEASURES REQUIRED

1. Woodland Management

The woodlot inventory shows that there are 18,332 acres of woodland on the R.D.H.P. Watersheds. Practically all of this area requires better management. While experimentation is desirable to determine the best method of handling certain problems, the general principles of woodlot management have been known for years but have not been applied. A free advisory service is available from the Zone Foresters, but is not sufficiently used, and a readily understood pamphlet on "The Farm Woodlot" can be obtained from the Department of Lands and Forests.

One of the most difficult problems confronting the private owner in the management of his woodland is the utilization of the small woodland products which can be readily made and handled by the owner. These products such as fuelwood, pulpwood, bolts, posts and poles, if properly harvested, increase the productivity of the woodlot and the gross returns per acre. The volume of these small products has been reduced by diameter limit regulations which have restricted the wholesale commercial slashing of woodlots. Nevertheless, much material of this type could still be produced from thinnings and improvement cuttings and from limbs and tops of trees. The difficulty of marketing such low-grade material has seriously hampered owners in carrying out the needed improvement work in their woodlots. Any means which can be discovered for using small and poor-grade wood should be developed to the fullest extent. At the present time interest is increasing in the possibility of manufacturing wood chips in the woodlot by means of a portable chipper. Such chips can be used for the manufacture of pulp for paper, and as cattle bedding and chicken litter, which can subsequently be spread on fields to increase the humus content of the soil. They can be made from any species of wood, and tops and branches can be utilized. The number of pulp companies which can use

hardwoods is limited at the present time and only those making kraft paper can use chips containing bark, but the demand for hardwood chips will increase and portable barkers are being developed. Every woodlot owner should consider the possibility of improving the quality of his woodlot by utilizing the low-grade material as chips or otherwise.

Owners of large woodlots might be encouraged to undertake thinnings and improvement cuttings if equipment or trained crews were available at reasonable cost. The Authority should consider offering such a service. As an alternative, the Authority might offer a subsidy for each acre improved to its specifications and found satisfactory on inspection by the Authority's officers.

2. Elimination of Woodland Grazing

The Report of the Ontario Royal Commission on Forestry, 1947, contains the following statement:

"The most widespread abuse of forests is that of utilizing them as pasturage for animals. If this practice alone could be eliminated more than half the battle to save Ontario woodlots would be won. Forestry and pasturage cannot succeed on the same piece of ground, as diametrically opposite conditions are necessary for each.

"It is foolish to consider replanting millions of acres to forests unless the owners of millions of acres already under forest are convinced of the necessity and economy of caring for them in such a manner that they will be perpetuated and improved."

This is not a new theme. As early as 1908 the Ontario Legislature, in providing an exemption from taxation of one acre in ten used for forestry purposes, included a "no grazing" clause.

There are a number of reasons for the widespread practice of allowing woodland grazing. The woodlot has always been considered a pasture field even though the value of woodland pasture is low compared to cleared land. The reason for its low carrying capacity is partly because grass grown in the shade is not nearly as high in food value as that grown in full sunlight. The following statement in respect to woodland pasture

Cattle have no place in a woodlot. They destroy regeneration, compact the soil and expose tree roots to disease.



Where a county has no Tree Cutting By-Law, trees which are too small for economic use may be cut or the valuable species cleared, leaving the area unproductive for many years.

A healthy woodlot should contain abundant young growth to replace mature trees as they are harvested.



has been made by leaders in agriculture: "On the whole, the opinion of the Agronomists is that, on the average, woodland pasture will produce about one-sixth the quantity of pasturage, and the quality will be about one-half as good as that of the improved pasture". Weeds are usually prolific in wooded pastures, often smothering most of the grass.

If shade is required for stock, it may be desirable to leave a portion of the woodlot in the pasture when fencing the woodlot. Another solution is to establish small groves of fast-growing hardwoods which can be fenced temporarily until the trees are sufficiently tall that browsing will not damage crown growth. Where springs or streams that supply water for the stock are situated in the woodlot, access may be made to a trough near the spring and the area should be fenced to prevent trampling.

The economic fallacy of grazing woodlands is illustrated by the following examples:

(a) *The Wisconsin Agriculture Experiment Station measured the total yield per acre of dry matter from three types of pasture over a five-year period in Richland County:

Improved pasture (grass and legume)	3,210 lbs.
Unimproved open pasture	1,453 lbs.
Woodland pasture	276 lbs.

Here the improvement of one acre of open pasture provided a gain of 1,757 pounds of feed, which is equivalent to the forage from 6.4 acres of woodland producing at the rate of 276 pounds per acre. In this case the improvement of about $6\frac{1}{2}$ acres of existing open pasture would provide all the additional roughage that could be obtained from 40 acres of woodland.

(b) †The U.S. Soil Conservation Service, co-operating

* The case Against Cows. Wisconsin Conservation Bulletin, December 1951.

† Soil Conservation Service, U.S. Department of Agriculture. Forestry Handbook (Fourth Edition). 1948. Upper Mississippi Region. Compiled and edited by S.S. Locke, Chief Regional Forestry Division.

with the Wisconsin Agriculture Experiment Station, conducted studies which showed that the daily pasture cost per cow was greater in woodland pastures. Taxes and other charges against the land, fencing, costs of establishment and acres required per cow were all considered. The study showed the relative daily pasture costs per cow on different classes of pasture to be approximately as follows:

Rotation pasture	5¢
Open permanent pasture	6¢
Improved pasture	5¢
Wooded pasture	17¢

At this rate, for a 180-day grazing season, woodland pasture cost \$30.60 per cow, whereas on improved pasture the cost was \$9.00. In other words, wooded pasture cost over three times as much as improved pasture.

(c) A fully timbered average maple stand, 60 years old, may yield about 4,000 board feet of saw timber per acre, net scale, in the R.D.H.P. area. Such a woodlot is virtually ruined by 20 years of heavy grazing, whereas 20 years of protection and no logging may increase the net volume to approximately 8,500 board feet per acre. The gain of 4,500 board feet is equivalent to an annual increase of 225 board feet per acre. At \$28 per thousand on the stump this amounts to a mean annual gross income of \$6.30 per acre over the period of utilizing only the increase in volume.

Basically the problem in grazing, as in all woodlot forestry, is the fact that a tree takes not one or two seasons but often more than the lifespan of a man before it is ready for harvest. This makes it difficult for many owners to understand the advantages of proper care for their woodlots or submarginal land. Examples such as those given show that good forestry practice in the woodlot will return more dollars than the scant forage value which it may produce for livestock. The Authority will find very little local or regional data on woodlands to prove these arguments on economic return, and

should recommend that the appropriate agencies extend their studies in this field.

The number of cattle permitted to graze and the size of the woodlot have a direct relationship to the damage which is done. A large woodlot, of course, is not as seriously damaged by a few head of cattle as a small one. However, in most cases where grazing is permitted over a number of seasons the damage is serious.

Livestock admitted to woodland browse on the leaves and shoots of small trees and ride them down, and by scuffing the surface roots of larger trees injure them and permit entry of fungus diseases.

Field observations indicate that cattle have preference habits in grazing woodlands. Unfortunately this preference is for the more economically desirable species such as maple, basswood, elm and beech, whereas undesirable species such as hornbeam, blue beech, dogwood and hawthorn are grazed only when cattle are seriously underfed. This combination of factors, under continued grazing, changes not only the quantity but the quality of the reproduction and so the succeeding stand. The poorer hardwood species, and conifers where these occur, are favoured. The invasion of pastures by cedar and hawthorn is an illustration of this grazing preference.

Continued overgrazing affects natural reproduction both directly and indirectly; directly in so far as it affects the reproduction itself and indirectly through its effect on the soil. Livestock trampling compacts the soil, breaks up the protective layer of litter, exposing the mineral soil to drying, and the cattle, by consuming the vegetation within reach, reduce the volume of litter naturally returned to the soil. It is this litter which keeps the soil open or porous and in a highly absorptive state. The changed water relations affect adversely the rate of tree growth and may eliminate at an early stage those seedlings which do manage to make a start in the compacted soil.

A woodland is doomed where conditions persist which will not permit natural regeneration. After a time with no new growth to replace larger trees which die of natural causes, the canopy begins to open up, and sunlight let in further dries out the soil. Weeds and later grasses which require plenty of light gain a foothold and a sod begins to form. In general, tree seeds which germinate cannot compete with an established grass cover. As these effects of grazing progress the stand becomes open or park-like and eventually all the trees disappear.

Livestock grazing affects more than the growth of trees on the owner's land. Soil erosion in the woodland increases as the absorptive capacity and mechanical protection afforded the soil by the litter are reduced. The open canopy exposes the soil to the erosive force of rain impact and a compacted soil forces overland movement of water. Livestock tend to follow trails in the woodland and these often become centres of serious erosion. Thus continued grazing increases surface run-off and soil erosion.

Soil losses and the amount of water which ran off the land were measured at the Soil Conservation Experiment Station, La Crosse, Wisconsin. The following table* shows the results of measurements of four heavy rains recorded during the 1935 growing season on three separate watersheds having the same soil type.

	<u>Run-off</u>		<u>Soil Loss</u>
	<u>Inches</u>	<u>% of Total Precipitation</u>	<u>(Lbs. per Acre)</u>
Watershed A (Grazed Woods)	1.01	12.61	1,560
Watershed B (Protected Woods)	.02	.25	20
Watershed C (Open Pasture)	.34	4.24	560

* Technical Bulletin No. 973. U.S. Department of Agriculture, Soil Conservation Service. 1949.

- Watershed A: 2.67 acres of second-growth hardwoods.
Slope 15 - 18 per cent.
Grazed to optimum carrying capacity.
- Watershed B: 11.5 acres of second-growth hardwoods.
Slope 25 - 50 per cent.
Neither grazed nor burned.
- Watershed C: 5.85 acres cleared of second-growth timber in 1932.
Slope 25 - 35 per cent.
Grazed to optimum carrying capacity.

Obviously, continued woodland grazing is more than the private affair of the property owner. Anything which contributes to soil loss and to increased surface run-off lowers the yield capacity of the land on the one hand and adds to the flood hazard on the other. The lessened value of wood products reaching the market and the increased cost per cow on poor pasture are economic losses to the community as well as to the individual. The Authority is therefore justified, not only in carrying out a vigorous campaign of education in woodland improvement, but also in offering direct assistance to woodlot owners. The County of Halton has for some time had a program of assistance for fencing of woodlots, although to date this program has not had a very marked success. It is recommended that the R.D.H.P. Conservation Authority through discussions with woodlot owners should formulate some modification of this program which will stimulate action toward the elimination of woodland grazing and the improvement of private woodlands.

Although much study and publicity have been given to this subject, the seriousness of the grazing problem has not yet been brought home to the person most concerned, the farm woodlot owner. It is recommended as a step in this direction that the Authority publish a simple, attractive bulletin on woodlot grazing.

3. Forest Fire Protection

In spite of the publicity given to the damage caused by fire the average person does not realize how serious this is. Though he may know that young growth and small trees

are burned by surface fires he does not realize the extent of the less obvious damage such as the destruction of humus which itself preserves the condition and water-retaining capacity of the soil. When the humus and ground cover are destroyed the sun and dry winds remove the moisture required for tree growth and plant nutrients are destroyed. The heat of the fire also injures the growing tissue inside the bark of older trees which are not actually burned, exposing the wood to attack by insects and fungi. Even though through time the wounds may be completely healed, the damage shows up as defects when the tree is cut for lumber.

Many landowners in Southern Ontario are so completely unaware of, or indifferent to, the damaging effects of fire that they deliberately set fire in peat land to burn off the peat, starting fires which it is next to impossible to extinguish. Such fires burn for months, even under the snow, destroying many acres of woodland every year, not only on the land of the person setting the fire but frequently spreading over land adjacent to it.

The first step in fire control is fire prevention, and the best assurance of prevention is an enlightened public opinion which will make every member of the rural community conscious of the seriousness of the fire damage and of his duty as a citizen to do all he can to prevent it. The farmer can prevent most fires in farm woodlots if he exercises the same care that he does around his home and buildings. It is particularly necessary to exercise such care in areas which have been cut recently, since the accumulation of slash creates a serious fire hazard. Close utilization of tops and the scattering of slash so that it lies close to the moist ground and rots faster will help to reduce this danger.

From the evidence collected in the northern states of the United States, where conditions most nearly approximate those of rural Southern Ontario, it is apparent that the most effective fire protective systems are those set

up under the following conditions:

- (a) Where the system is organized under the direction and control of the state forester and the wardens in each town are appointed by him on the recommendation of the local council.
- (b) Where wardens paid an annual retainer are actual residents in the locality. Usually they are farmers who have had practical instruction in fighting fire. They have the power to call out other local residents to help in fire-fighting and maintain a store of fire-fighting tools on their premises.
- (c) Where the warden is assisted in his work by all members of the community. That is, his address and telephone number are known to everyone and fires are reported to him immediately.
- (d) Where designated members of the community know that they are likely to be called on to fight fire and are paid so much per hour for the time they are so employed.
- (e) Where every resident is thoroughly fire-conscious and realizes that loss of timber by fire is a loss to the whole community, and considers it his duty to prevent, report and fight fire.
- (f) Where fires for burning brush and rubbish may be set only after a permit has been obtained from the local firewarden.

It is therefore recommended that the Authority set up a committee to determine the best method of providing fire protection for public and private lands, through the co-operation of the Department of Lands and Forests, for the protection of woodlands in the R.D.H.P. Watersheds.

If opinion in favour of such a move were sufficiently widespread, it is possible that all of Southern Ontario could be declared to be a "fire district" under The Forest Fires Prevention Act. This would place organization



A stump fence testifies to the fine pine stands which once were common in the area.

Simple protective measures should be more generally used. This ploughed fire-guard and sign giving the caretaker's telephone number reduce the danger on the Ontario County Forest.



Snow fences of trees on the windward side save the municipality thousands of dollars in the erection and removal of artificial fences each year.



and administration under the experienced staff of the Department of Lands and Forests. The Select Committee on Conservation, 1950, recommended that:

"On application to the Minister of Lands and Forests, the boundaries of the fire district should be extended to include those municipalities or areas that have 25 per cent or more of their area classified as woodland, slash, waste or swamp lands; and

"In all other municipalities the Minister of Lands and Forests should be empowered to enter into agreements to provide forest fire protection and to charge a portion of the cost back to the said municipalities."

In the meantime powers already exist for counties under The Fire Extinguishment Act (R.S.O. 1950, Chapter 142), and for townships, under The Municipal Act (R.S.O. 1950, Chapter 243, Section 388) and The Fire Guardians Act (R.S.O. 1950, Chapter 139) to appoint officers and make regulations for the prevention and suppression of fires in their areas.

4. Protection from Insects and Diseases

In projects such as the public and private reforestation recommended for the R.D.H.P. Watersheds, careful consideration should be given to the prevention of outbreaks of insects or tree diseases and adequate arrangements made for the immediate application of control measures when these become necessary. While it is not possible to predict accurately the course insects or disease may take under the ever-changing conditions of a newly forested area, there are a number of fundamental principles which, if applied, will greatly lessen their destructiveness.

Large areas of one kind of tree present ideal conditions for an outbreak of insects or fungus disease. Mixing species in the plantation or separating the species in small blocks tends to slow the spread of outbreaks until natural agencies bring them under control or direct control measures can be applied.

It is important to plant only the species of trees suitable to the site and existing growing conditions. Healthy, vigorous trees are certainly more resistant to attack

than weak, struggling ones.

Over-mature and dead trees should be removed from the existing stands as these harbour bark-beetles and wood-boring insects which may become excessively abundant and attack healthy adjacent trees. Fungus infections may likewise spread from such sources.

Care should be exercised to prevent ground fires. Even light ground fires are frequently followed by severe outbreaks of bark-beetles and wood-boring insects and fungus infection at the base of the trees.

Woodcutting operations, sawmill sites and wood storage yards should be carefully supervised or they may become reservoirs of infestation.

It is essential that an inspection be made each year so that any abnormal increase in insects or disease may be noted and control measures initiated before the outbreak becomes serious. Prompt action may reduce control measures to a comparatively easy task and confine damage to a small area.

(a) Some Important Insect Pests

The White Pine Weevil has caused serious damage to plantations by attacking the leading shoots of young white pine. As this insect prefers to work in full sunshine, white pine should be grown in mixture with some other species which will shade the pine in its early years.

In recent years the European Pine Shoot Moth has increased to epidemic proportions in red and Scotch pines. Investigations are under way but no simple and effective control measures have yet been discovered. Another enemy of these species, the Root-collar Weevil, has recently been reported near Angus in Simcoe County. This insect kills young trees by girdling them below the ground. In the U.S.A., where this insect is better known, certain emulsions applied around the base of infested trees are said to give good control.

Leaf-feeding insects may kill conifers by one complete defoliation and hardwoods by defoliation for three

years in succession. However, even partial defoliation may so weaken trees that they will be attacked by other enemies. Protection from leaf-feeding insects is therefore desirable. This is the kind of attack against which spraying is most successful.

Since investigations of forest insects are constantly under way, the owner considering insect control should always check with the Zone Forester to find the most effective methods now in use.

(b) Tree Diseases

The chief diseases of the hardwoods are the various trunk, butt and root rots, and chronic stem cankers, which are all endemic and may cause serious damage under aggravating conditions. Woodlots on the R.D.H.P. Watersheds present very diverse conditions with respect to the incidence of these diseases, a circumstance which is usually related to their past history. Thus many containing old timber are in need of heavy preliminary salvage and sanitation cuttings as a result of mismanagement or neglect. Such cuttings should precede or be combined with cleanings and improvement cuttings, designed to improve the composition and structure of the stands. Having established a sanitary condition, normal care should maintain it and obviate loss on account of decay.

The wood rots are commonly thought of as diseases of mature and over-mature timber, but experience has shown that infection may occur at a very early age. In hardwood sprouts the stem may be infected from the parent stump. In older trees infection is chiefly through wounds, either of the root or trunk, which may be caused by fire, trampling by animals, insects, meteorological agencies, or by carelessness or accident in felling and other woods operations.

For many reasons "cleanings" in the reproduction are desirable, especially where the woods have been heavily cut. Besides favouring the valuable species, those stems which are of seedling origin should be favoured over stump sprouts which are more liable to decay.

In harvest cuttings, which should recur at frequent intervals, the permissible volume allotted should include trees in which incipient decay is discovered and so far as possible those which have become a poor risk through injury or other circumstances.

The white pine blister rust is a serious enemy of that important species. It can be controlled by elimination of the currant and gooseberry bushes which spread the disease. This is economically feasible where white pine is growing on good sites, and where a considerable concentration of white pine on a small area reduces the labour involved.

5. Windbreaks and Shelterbelts

In the process of clearing land for agriculture, woodlots and belts of trees along fence lines have been removed which had served as natural shelterbelts. The restoration of these in the form of windbreaks is essential to a complete conservation program in many parts of Southern Ontario.

When proper species are used and windbreaks are correctly placed the effects are almost entirely beneficial. The effects may be direct or indirect, but in either case are the result of reduction in wind velocity. The effects of windbreaks on crops and cultivated fields may be listed as follows:

(a) Direct Effects

- (1) Wind damage and lodging in small grains and corn is reduced or eliminated.
- (2) Snow and the resultant moisture are more evenly distributed over fields, particularly on the higher spots where they are required most.
- (3) Wind erosion of the soil is minimized.

(b) Indirect Effects

- (1) Moisture loss by evaporation is reduced.
- (2) Temperatures in the fields are raised, which may prevent frost damage, accelerate growth and even lengthen the growing season slightly.
- (3) Erosion of the soil by water may be reduced by its more even distribution when released from snow.

The benefits of windbreaks to buildings in reducing heat loss in winter have been shown to be considerable. Experiments conducted in the United States proved that more than twice as much heat is lost from a house, per day or per hour, with a wind of 20 m.p.h. as with one of 5 m.p.h., and windbreaks can easily reduce wind velocities in this proportion. Used in this way they can often be made to form an effective background for the house and a protection for farm buildings. Another advantage of windbreaks is that they provide shelter and runways for insectivorous birds and small animals.

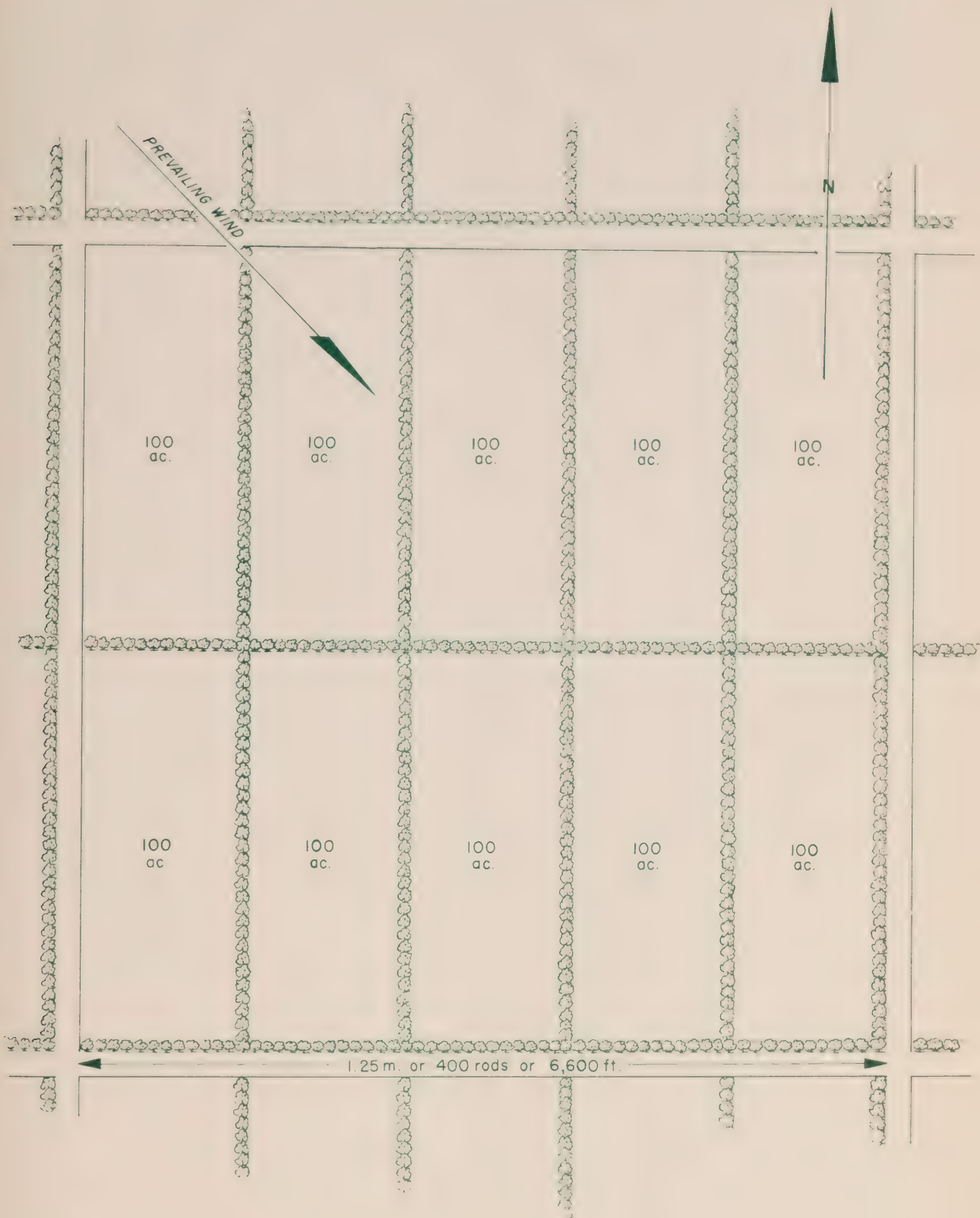
Belts of trees comprising one or two rows are usually called windbreaks, and with more than two rows, shelterbelts. In Southern Ontario windbreaks as a rule give sufficient protection except where wind erosion of soil on rolling land is severe, when shelterbelts may be required. On level land windbreaks may nearly always be established along existing fence lines, but on rolling land consideration should be given to the contour of the land. The prevailing winds in Southern Ontario are generally from the west, so that the greatest protection will be derived from windbreaks on the west side, but the placement of windbreaks on the other three sides as well should be considered.

Both the height of the trees and the wind velocity influence the effective range of a windbreak. An average windbreak will reduce the ground velocity of a 20-mile wind 10 per cent or more for a distance of about 30 times the height of the trees. About one-fourth of this effect will be felt on the windward side of the windbreak and three-fourths on the leeward side. For example, if the trees are 40 feet high the total effective range with a 20-mile wind will be 30×40 or 1,200 feet, 300 feet of which will be on the windward side and 900 feet on the leeward side. Generally speaking, the reduction in velocity is greatest close to the windbreak and tapers out to zero farther away. With higher wind

WINDBREAK PLAN

for

1,000 ACRE BLOCK



This plan shows the minimum windbreak requirements for a 1,000 acre block on level land. Woodlots and plantations will replace some of this and placement will have to be adjusted according to topography and soil on rolling land.

velocities and/or higher trees the proportionate reduction and the effective range will be greater.

European alder is gaining great popularity as a windbreak tree because it is a nitrogen-fixer like the legumes and does not rob the soil to the same extent as non-nitrogen-fixing species.

One consideration that should be kept in mind is that under certain circumstances windbreaks may cause air stagnation, which may increase temperature and moisture conditions to a dangerous degree in summer or increase frost damage in spring and fall on small areas, particularly in hollows. Where this is likely to occur, windbreaks should be planted so as to guide the flow of air past such spots. Where these conditions develop after the windbreaks are established they may be relieved by judicious opening up of the windbreaks.

Experience has shown that windbreaks are an asset to any farm, that their adverse effects, if any, are local and easily remedied, and that in many areas they are essential to the control of soil erosion by wind. It is therefore recommended that the Authority encourage in every way the establishment of windbreaks by private owners.

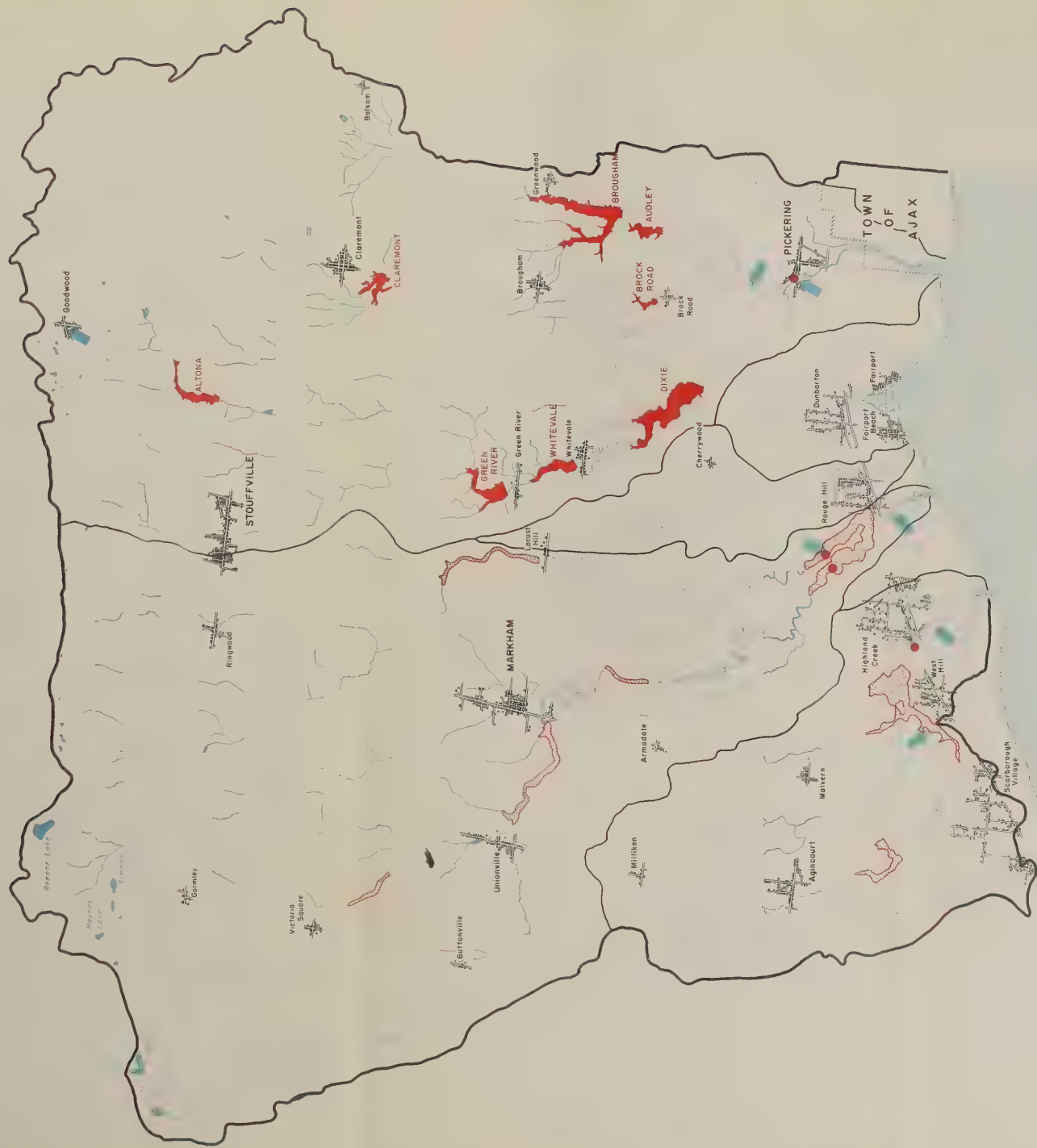
WATER

CHAPTER 1

GENERAL DESCRIPTION OF THE WATERSHEDS

The R.D.H.P. Authority comprises the watersheds of the Rouge River, Duffin, Highland and Petticoat Creeks and the wedge-shaped drainage areas of small creeks draining directly into Lake Ontario at Port Union and Frenchman Bay (Fig. 1). The combined area of the watersheds is rectangular in shape measuring about 17 miles in width by 19 miles in depth from Lake Ontario and has a total area of 310.14 square miles. It is bounded on the west by the Don River Watershed; on the north by parts of the Humber and Holland Rivers, Pefferlaw Brook and Uxbridge Brook Watersheds; on the east by the Non-quon River, Lyon Brook and Lynde Creek Watersheds and on the south by Lake Ontario.

The geology is discussed in detail in the Land Use part of this report but in order to show the effect that the land forms have on run-off they may be briefly referred to here. The R.D.H.P. Watersheds include kame moraines, till plains, bevelled till and clay plains. With the kame moraines, if not saturated, frozen or covered with ice, there is deep penetration of precipitation which reduces surface run-off considerably. The till plains are drumlinized or fluted and are moderately impervious but have hollow and swamp areas which delay run-off to some extent. The bevelled till plains are classed as impervious but have pockets which hold run-off and reduce run-off to that extent. Clay plains are also impervious and soon become saturated and with heavy rain the run-off approaches 100 per cent. Except for the pockets which hold water, the steep slopes of the watershed greatly reduce the benefits of the pervious soils and the reduction and delay of surface run-off in the more rugged areas. The accompanying Table 1 shows the various soil classifications and the approximate percentage of each.



ROUGE, DUFFIN, HIGHLAND AND PETTICOAT
WATERSHEDS
SHOWING
RESERVOIR SITES AND TROUBLE AREAS

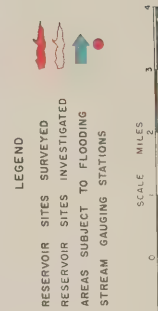


TABLE I

THE APPROXIMATE ORDER OF PERMEABILITY FOR EACH SOIL TYPE FROM BEACH AND BOULDER, THE MOST PERVIOUS, TO BEVELLED TILL AND CLAY PLAINS, THE LEAST PERVIOUS AND THE APPROXIMATE PERCENTAGES OF EACH.

Soil Types	Rouge River %	Duffin Creek %	Highland Creek %	Petticoat Creek %
Pervious				
Beach, Boulder	0	2	6	9
Kame Moraine	7	28	--	--
Sand Plain	6	6	18	22
Semi-Pervious				
Drumlinized Till Plain	43	44	76	58
Almost Impervious				
Bevelled Till Plain	43	4	--	--
Clay Plain	1	16	--	11
Percentage Totals	100.	100	100	100
Drainage Areas Square Miles	129.69	119.94	39.45	10.41
Average Gradient Approx. Feet Per Mile Headwaters to Lake Ont.				
East Branch	34	45	31	--
West Branch	26	37	25	--
Average for Both Branches	30	41	28	--
Main Branch	--	--	--	51

1. Watersheds and Rivers

(a) The Rouge Watershed

The Rouge Watershed lies between that of Highland Creek on the west and Duffin and Petticoat Creeks on the east. It is a fan-shaped area funnelling into Lake Ontario at Rosebank Station. The northerly part varies from 8 to 12 miles in width and the southerly part converges from a width of 6 miles at Steeles Avenue to about one mile at the lake. Its overall depth from the lake is about 19 miles and the area is 129.69 square miles.

Most of the watershed consisting of the central part is in the Township of Markham with a small northerly segment in the Township of Whitchurch and a small triangular area of about 4 square miles at the southerly end in the Township of Scarborough. There are no towns on the watershed and the only incorporated villages are Markham and Stouffville*. Non-incorporated villages and hamlets are Mountjoy, Vinegar Hill, Unionville, Buttonville, Ringwood, Locust Hill, Gormley and others.

The stream gradients and lateral slopes of the whole watershed are heavy varying in the central and southern parts from 25 to as much as 250 feet to the mile. In the headwater region in Whitchurch and the north-west part of Markham Townships the terrain is particularly hilly and rugged with slopes varying from 175 to 375 feet to the mile. These heavy gradients on the Rouge and other watersheds of the Authority are one of the chief physical factors which cause floods in this area.

The central portion, or about 45 per cent of the watershed, is bevelled till plain including small sand areas which form about 3 per cent of the area. Lying north and south of the bevelled till plain there are drumlinized till plains amounting to 43 per cent of the total watershed area. About 7 per cent of the area along the northerly fringe of the watershed is kame moraines. The segment between the drumlinized till plains and the lake amounting to about

* Stouffville is astride the height of land between the Rouge and Duffin Watersheds.

5 per cent of the watershed has approximately equal areas of sand and clay plain.

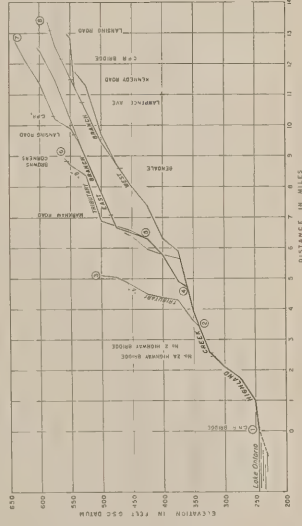
The Rouge River has many tributaries, the principal ones being the Little Rouge and Beaver Creeks. Seven other tributaries have been designated on Fig. 2 by letters "A" to "G". The Rouge River rises about one mile north-west of Gormley C.N.R. station, at an elevation of 985 above mean sea level and flows in a general south-easterly direction for a distance of 27 miles to Lake Ontario (mean water level 245.89). The total fall is 739.1 feet or an average fall of 27.4 feet to the mile which is a heavy gradient. The table on Fig. 2 shows the gradients of the river section by section which vary from 10.9 to 132.1 feet to the mile. The Little Rouge Creek which drains the easterly part of the watershed and joins the main river just above No. 2A Highway about a mile and a half from the lake is the most important tributary. The figure shows many of the other tributaries and their respective gradients, many of which are steeper than those of the main branches. The Little Rouge has a drainage area of 41.7 square miles while the main Rouge River has a drainage area of 87 square miles above the "forks".

(b) The Duffin Creek Watershed

Duffin Creek Watershed is also a fan-shaped area funnelling into Lake Ontario at the westerly boundary of Ajax. Its greatest width is $10\frac{1}{2}$ miles in the northerly part, tapering to about $1\frac{1}{2}$ miles at the south end near the lake. It measures about 18 miles from the lake to its northerly limit and has an area of 119.94 square miles.

The headwater portion is in the Township of Uxbridge and about 5 square miles at the north-westerly corner is in the Township of Whitchurch; the southerly and greater part is in the Township of Pickering except for a fringe area of 4 square miles which is in the Township of Markham.

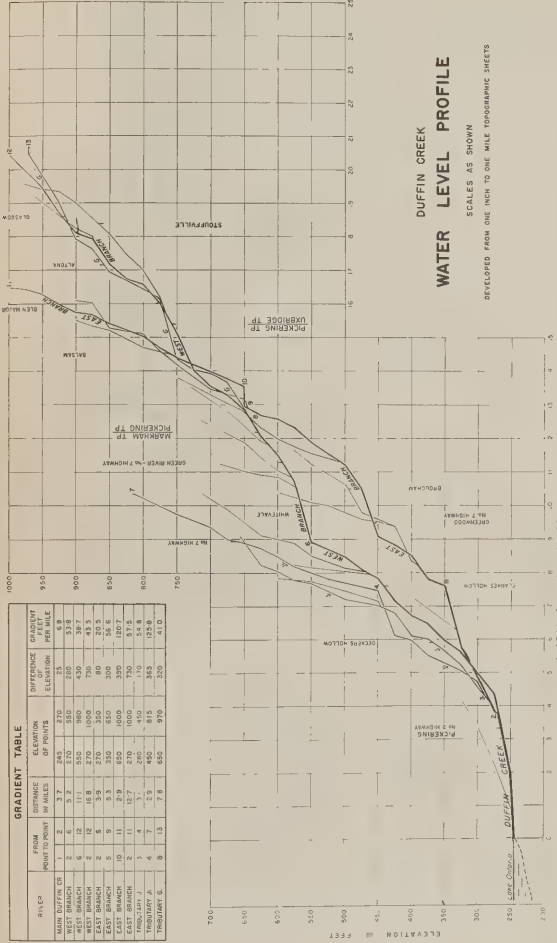
GRADIENT TABLE				
RIVER	FROM POINT TO POINT	STATIONS IN MILES	ELEVATION OF POINTS	DIFFERENCE IN ELEVATION
MALE HIGHLAND	1	4.70	245.0	115.0
EAST BRANCH	4	8.50	235.0	24.5
WEST BRANCH	5	8.50	235.0	25.5
MALE HIGHLAND	7	12.75	245.0	35.0
THURGOOD "A"	2	1.70	245.0	10.0
THURGOOD "B"	3	2.65	455.0	235.0
PETTICOAT	9	10	245.0	30.7



HIGHLAND CREEK PETTICOAT CREEK WATER LEVEL PROFILE

SCALES AS SHOWN
DEVELOPED FROM ONE INCH TO ONE MILE TOPOGRAPHIC SHEETS

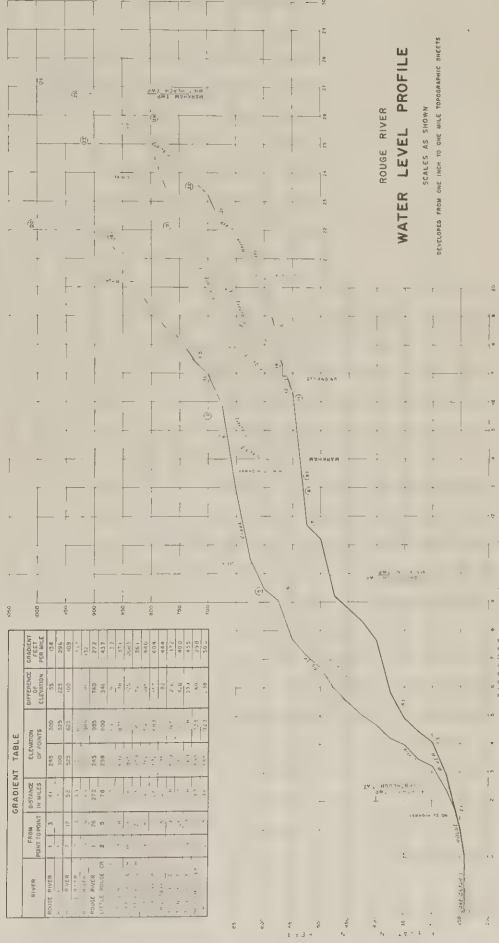
GRADIENT TABLE				
RIVER	FROM POINT TO POINT	STATIONS IN MILES	ELEVATION OF POINTS	DIFFERENCE IN ELEVATION
MALE DUFFIN CREEK	1	2.7	245.0	15
WEST BRANCH	2	12.5	235.0	38.7
EAST BRANCH	3	12.5	235.0	43.5
MALE DUFFIN CREEK	4	12.5	235.0	43.5
THURGOOD "A"	5	12.5	235.0	43.5
THURGOOD "B"	6	12.5	235.0	43.5
PETTICOAT	7	12.5	235.0	43.5



DUFFIN CREEK WATER LEVEL PROFILE

SCALES AS SHOWN
DEVELOPED FROM ONE INCH TO ONE MILE TOPOGRAPHIC SHEETS

GRADIENT TABLE				
RIVER	FROM POINT TO POINT	STATIONS IN MILES	ELEVATION OF POINTS	DIFFERENCE IN ELEVATION
ROUGE RIVER	1	11	245.0	15
WEST BRANCH	2	12.5	235.0	38.7
EAST BRANCH	3	12.5	235.0	43.5
MALE DUFFIN CREEK	4	12.5	235.0	43.5
THURGOOD "A"	5	12.5	235.0	43.5
THURGOOD "B"	6	12.5	235.0	43.5
PETTICOAT	7	12.5	235.0	43.5



ROUGE RIVER WATER LEVEL PROFILE

SCALES AS SHOWN
DEVELOPED FROM ONE INCH TO ONE MILE TOPOGRAPHIC SHEETS

The only incorporated village is Pickering.

Non-incorporated villages and hamlets are: - Altona, Balsam, Brougham, Claremont, Clarke's Hollow, Decker's Hollow, Glasgow, Glen Major, Goodwood, Greenwood, Green River, Whitevale and others.

In the headwater zone, most of which is in the Township of Uxbridge, the terrain is rugged kame moraines which make up about 28 per cent of the watershed area. The central zone or about 44 per cent of the watershed, is drumlinized till plain. To the south of the latter land form, there is a sand zone (6 per cent) and from here to the lake it is chiefly clay plain (16 per cent) with scattered patches of boulder pavements (2 per cent) and drumlins.

The lateral slopes from the headwaters to within 4 miles of the lake are heavier than those of the Rouge River.

The watershed is drained by two major creeks, the East and West Branches, their confluence being about $3\frac{3}{4}$ miles from the lake and about half a mile upstream from No. 2 Highway. They both have several tributaries which are shown on Figures 1 and 2. The East Branch rises about a mile north-west of Glen Major at an elevation of about 1,000 feet, flows in a general southerly direction about $16\frac{1}{2}$ miles to its outlet at the lake. The difference in elevation from its source to the lake is about 755 feet for an average fall of 45.7 feet to the mile. The West Branch rises in a swamp about 3 miles north-east of Stouffville at an elevation also of about 1,000 feet and flows in a general southerly and south-easterly direction for a distance of 16.7 miles to its confluence with the East Branch. The fall to Lake Ontario is also about 755 feet or 36.8 feet to the mile.

(c) The Highland Creek Watershed

The Highland Creek Watershed is an irregular 3-sided area bounded on the west by the Don Watershed and the

north and east by the Rouge Watershed and that of a small creek which empties into the lake about $\frac{3}{4}$ of a mile north-east of Port Union. The southerly boundary loops along No. 2 Highway for about 4 miles and thence due east for $2\frac{1}{4}$ miles to Lake Ontario near the mouth of Highland Creek.

The watershed has an average width of 5 miles and a depth from Lake Ontario of approximately 8 miles with a total area of 39.45 square miles. Where it funnels into the lake the watershed is arrow-shaped with a width along No. 2 Highway of $2\frac{1}{2}$ miles and about half a mile frontage on the lake.

About $2\frac{1}{4}$ square miles of the headwaters zone is in Markham Township and the remainder of the watershed is in Scarborough Township. There are no incorporated towns or villages on the watershed. Some of the non-incorporated villages and hamlets are: - Agincourt, Bendale, Highland Creek, Malvern, Milliken, Scarborough and West Hill.

The Township of Scarborough is within Metropolitan Toronto and a large portion of the Township, particularly the south-westerly part which includes a large segment of the watershed, is well urbanized.

The watershed is drained by two main creeks each with many tributaries, their confluence being 2.2 miles upstream from No. 2A Highway and 4.7 miles from the lake.

The East Branch rises about $\frac{1}{2}$ a mile west of Milliken at an elevation of about 648 feet. It has a general irregular south-easterly course for about 8 miles to its confluence with the West Branch and thence easterly on a tortuous course to Lake Ontario. The total fall from the headwaters to the lake is about 402 feet or 31.7 feet to the mile. The drainage area of the East Branch above the forks is 13.2 square miles.

The West Branch rises about $2\frac{1}{2}$ miles north-west of Agincourt at an elevation of about 590 feet. It flows in an

irregular and general south-easterly direction to a point near Scarborough Village where it turns north-easterly to the forks, an overall distance of 8.9 miles. The fall from headwaters to the lake averages about 25.3 feet to the mile and the drainage area is 17.5 square miles.

The average gradient of the East Branch is slightly greater than that of the Rouge River (27.4' to the mile) but the lateral slopes to the streams are much less than those of the Rouge area.

Running north from West Hill there is a belt of former sandy shorecliffs less than $\frac{1}{4}$ of a mile wide crossing the narrow neck of the watershed. The area between the shorecliffs and the lake which is about 24 per cent of the total watershed area, is chiefly sand plain with 3 small areas of boulder pavements and drumlins. The remaining 76 per cent north of the shorecliff belt is drumlinized till plain except for 4 small areas of drumlins.

(d) The Petticoat Creek Watershed

The Petticoat Creek Watershed is an elongated area lying between the Rouge River Watershed on the west and those of the Duffin and Pickering Creeks on the east. The area has an overall length of 9 miles with a maximum width of $2\frac{1}{2}$ miles at Cherrywood.

The two main headwater branches rise in the area between Locust Hill and Whitevale and follow a general southward course to their confluence at a point about 3 miles from the lake. From this point the main creek continues in the same general direction to where it empties into Lake Ontario about $\frac{3}{4}$ of a mile west of Frenchman Bay.

The lateral slopes of the drainage area are quite steep as are the stream gradients. The soil types are similar to those of the adjacent watersheds being chiefly drumlinized till plain in the central and upper parts and sand plain in the lower part with a narrow band of clay plain along the lakefront.

The area lies for the most part in the Township of Pickering but includes the north-east corner of the Township of Scarborough and the south-east corner of the Township of Markham.

Cherrywood and Belford and parts of Locust Hill and Rouge Hill, which are un-incorporated communities, are also included.

Table II shows the drainage areas in square miles and acres for each of the main watershed areas in the R.D.H.P. Authority together with those of the smaller intermediate areas.

TABLE II
DRAINAGE AREAS R.D.H.P. WATERSHEDS

Watershed	Drainage Area Square Miles	Drainage Area Acres
Rouge River	129.69	83,001
Duffin Creek	119.94	76,761
Highland Creek	39.45	25,243
Petticoat Creek	10.41	6,664
Area Between Highland and Rouge Watersheds	1.86	1,190
Area Between Rouge and Petticoat Watersheds	0.27	172
Area Between Petticoat and Duffin Watersheds	8.53	5,456
Total Area - R.D.H.P. Authority	310.14	198,490

CHAPTER 2

FLOODS

1. Former Floods

Reference to the accompanying check list of floods on the streams that drain the R.D.H.P. Watershed shows that public attention was first drawn to such floods in the year 1850; and that the number of floods recorded after 1900 greatly exceeds the number recorded before that date. It seems likely that this evident disproportion in the number of floods recorded before and after the turn of the century reflects, not the actual frequency of the occurrence of flood conditions, but rather the adequacy of the reporting by which, in the earlier decades, the floods were seldom recorded, and, in more recent times, became much more frequently the subject of published news reports. In many cases, it reflects also the increased importance attached by a community to flooding when material property of increased value is damaged, destroyed, or jeopardized by exposure to the risk of flooding.

In the years before 1850, the residents of the communities that border the Rouge River and Duffin and Highland Creeks, seldom mentioned the rising of the waters in these streams. If they referred to such phenomena in their letters, diaries, and other writings, the records are few and obscure, and for the most part, are unknown and inaccessible.

A number of references to high water in the area under consideration are to be found in the reports submitted by inspectors who examined the Dundas Street from the Town of York eastward to the Trent River, in the years 1799 to 1802. Mr. Asa Danforth's proposals for opening this road were accepted in Council on April 9, 1799, and, as he carried forward the work of construction, month by month, and mile by mile, the surveyors appointed by the Government to inspect his progress must have been close at his heels. On November 9, 1799, William Chewett, Senior Surveyor, completed his examination of

the first ten miles, "said to be ready for inspection". Later in the same month, it was stated that "Mr. Chewett has been absent since the 23rd Inst. examining Mr. Danforth's Road". Chewett's Report of this second tour of inspection, dated December 6, 1799, includes the following paragraph.

"The time for inspection was too late in the Season, for when an inspector is almost frozen, he cannot act as he ought to do in such weighty matter, he should have been enabled to have examined the Strength of the Bridges under as well as over, of the Timber that they consisted of, and of the probability, or chance of any of them, or part of any of them being carried away by the Currents in the Spring, which only the Spring can determine, for I have no knowledge of the rise, and fall of the Waters, never having been over the ground when a very essential point, the Waters marks, were to be seen."

In the following August, another surveyor, Mr. Lewis Grant, examined the same road, and on August 25, 1800, made his report, from which the following passages are excerpts.

"The Bridges are Sixteen and a half feet wide, and in my humble opinion sufficiently strong, and of a proper length to prevent the water from taking off the covering. . . . The Contractor has Causeway'd three Miry places on the Tenth Mile, and raised the Bridge on the West Branch of the Highland Creek. Mr. Thomson of the Township of Scarboro' having informed me that the Water Run over it last Spring."

Again, on October 2, 1802, Messrs. William Chewett, John Ashbridge, and Josiah Coolidge submitted to the Surveyor General of Upper Canada their report as "Inspectors on the Communication called Dundas Street Road, from the Town of York to the River Trent, opened by Asa Danforth". The report was concerned with estimates of the cost of maintaining and repairing the various parts of the road, and does not make direct mention of the causes of disrepair; it is probable that, at least in part, this was attributable to flooding.

"The little Highland Creek Bridge, for Sloping the Hills at each end, & repairing the East end of the Bridge 2 - -

" - at the Great Highland Creek - The Bridge
to be lengthened 6 Rods - The East end of it
too low 3 - -

" - 1st Bridge from the Highland Creek, for
Slopeing the Hills at each end & repairing
the same 2 10

"A ravine between the 16th & 17th Mile post
with high banks, for Slopeing and a new
Bridge & Causeway about 8 Rods 12 10

"The Bridge over the River Rouge, or Nen.
The abutments not sufficient, the string
pieces too weak & too few. The abutments
at the East end having failed & the string
pieces broken; the remainder of it will not
last another Season, Consequently it will
require a New one Estimated at 50 - -

"23d Mile near Mungers (i.e., Pickering
village) The Bridge over Duffins Creek the
string pieces not sufficient in Number or
strength 2 10 -"

The repairs required to put the bridge over
the Rouge River in proper condition were still under dis-
cussion in September, 1803, when William Chewett wrote on the
subject to Mr. Samuel Munger, of Pickering:

"York, 14 September 1803

"Mr. Munger,
"Sir,

"You are requested to inform me, as you
have found out a better situation for carrying a
Bridge over the River Nen, or Rouge, how far to
the Northward of Danforth's Bridge this
situation is, and what would be the expence to
make a good log Bridge over the River at the
place you propose. Also what distance from the
River on the West side you would turn off from
Danforth's Road, and at what distance you would
come into the same, to the Eastward of the
River Rouge. What is the whole of the distance
and what would be the Expence for making this
part of the Road. Also to say what would be the
Expence to repair the old Bridge.

I am &c
Wm. Chewett
Sen'r Surveyor"

Mr. Munger's reply to this letter has not been found.

In nearly fifty years after the date of this
letter only one definite reference to flood damage on any of
these streams has as yet been found. In 1837 Peter Milne,
Senior, of Markham, made the following entry on the fly-leaf*

* Now in the possession of John Lunau of Markham. The fly-
leaf and first page have been torn from the binding
which is lost.

Duffin Creek at Pickering March 7, 1956. Church Street flooded due to ice jam at bridge upstream.



Duffin Creek upstream from Church Street bridge shows channel choked with heavy ice floes.

No. 2 Highway at Pickering flooded due to ice blockage in stream channel.



of his pass book with the "Merchants Bank" of New York:

"Tuesday 16 May 1837 the Bridge oon (sic) the Rouge between the Mill and the Village Washed away by the Flood.

12 June 1837 the New Bridge made and Passable over the above River".

Receipts in a notebook of Milne's for sums paid by him for labour and materials used for the bridge show that it was of some size. It is not clear whether he was acting for the District Road Commissioners or whether the bridge was his own property. If the Rouge flooded heavily on May 16, 1837, it probably did so on some other dates when floods are known to have occurred on other rivers between 1820 and 1850. But it would be unsafe to assume that a flood destroyed the Rouge Bridge on Dundas Street about 1829 because Captain Basil Hall had to "swim" his wagon in that year; or that a large proportion of the money expended on the bridge before 1850 was for repairs due to flood damage.

Between 1850 and 1900 seven reports have been found of floods in this area. On only one of these occasions are more than one of the streams that traverse the area mentioned as flooding. On September 13, 1878, the date of the greatest flood ever experienced on the adjacent Don River, it is reasonably certain that all the streams of the R.D.H.P. Watershed must have been affected; yet only the Rouge River is mentioned in the reports. In the same way, it seems likely that the flood of June 5, 1890, so destructive on Duffin Creek, must have affected the Rouge River and Highland Creek, as well as the smaller streams in the same vicinity; severe flooding on this date was recorded as far east as the Trent River, as far west as the Thames, and as far north as the vicinity of Barrie. The reports from the R.D.H.P. Watershed are from two points only, both on Duffin Creek.

"Greenwood, Ont., June 6 - The worst freshet ever known here occurred on Thursday evening (June 5th). For the past two nights terrific thunderstorms have raged and the waters were high, but the climax was reached last night.

"Four small dams north of here gave way; and the mighty flow of waters carried away Mr. F. L. Green's dam, then the new dam, and the race broke away, and last of all the dam of the Oatmeal Milling Company broke away. Roads were submerged and gutted, cellars were flooded, bridges were carried away, and telegraph lines broken. Timber and trees were seen floating in all directions. Several persons have lost cattle and horses. The roads in the vicinity are in a terrible state."

"Pickering, June 6 - This place was visited last night by the greatest and most destructive flood ever seen in this vicinity, caused by the extremely heavy rains of yesterday. A number of mill dams north of here were washed out, swelling the river to a mighty torrent, overflowing all the flats and carrying everything before it. Many cattle and horses were swept along by the flood, two or three of which were drowned. Six or eight bridges near here have been swept away, some of them large structures. Timber and fences are scattered in all directions. One gentleman who was on a bridge when it was swept away experienced a dark and perilous ride for some distance down the stream, finally rescuing himself by climbing to the top of a small elm tree. Several boat houses and boats were also carried away. The village bus with six occupants was in the water in a very dangerous position two hours. They were got out safely by the aid of some of the villagers. The loss will be heavy, especially for bridges."

The desultory character of the reporting of floods on the streams of the R.D.H.P. may be attributed in part to the prevalence in this vicinity of the view that floods were an annual event and a perennial nuisance. The following paragraph, quoted from the Pickering News, of February 19, 1954, somewhat lightly dismisses what was actually a flood of more than average severity.

"This neighborhood has seen an annual spring flood, for ages, forest or no forest, and while oldsters around here recall some very serious floods fifty years ago, they don't seem to be any worse today than they were at that time, but - there are more persons living in the flood areas than in those days. A number of families on north Elizabeth St. (Riverside), had an anxious time this week, when homes were surrounded by water and several 'rescues' had to be made."

As may be seen from the comments included in the check list, many of the floods in this watershed were of a character to lend support to the view that floods here were little more than an annual event, not to be taken too



Riverside Drive on Duffin Creek, March 7, 1956. The ice jam shown here extended downstream for several miles.



Dwelling on Riverside Drive. High water mark is visible along front and side of house.

Another view on Riverside Drive. Flood waters had receded several feet when this and the above photograph were taken.



seriously. Some of the recorded floods, however, demanded more serious attention, notably those of June 5, 1890 (described above); April 4, 1950; and October 15, 1954 (Hurricane Hazel). Because, in the vicinity of Toronto, the floods that followed Hurricane Hazel occasioned enormous damage and gained outstanding notoriety for their severity, the present report here includes an account of the damage done by the same storm in the R.D.H.P. Watershed.

On October 15, 1954, Hurricane Hazel struck the north shore of Lake Ontario, both east and west of Toronto, and released so great a downpour of rain on an already-near-saturated surface that, within a few hours all the streams in the area were running bank-full and overflowing. Before midnight, five cottages on the banks of Highland Creek had been washed into the creek and destroyed; and before the morning of the 16th, ten more had followed them. The number of cottages thus destroyed climbed, on the 16th, to seventeen. In the course of that day, Highland Creek near Agincourt was described as "swollen five times its size"; this swollen stream had washed out a wooden bridge on the line of the Canadian National Railways, leaving a length of 135 feet of rails hanging in the air. The road bridge over Highland Creek at the Willows, near Lawrence Avenue, was washed out; and the old Kingston Road bridge over the same creek was rendered impassable. The Scarborough Township police estimated the rise in Highland Creek at sixteen feet. In the whole of Scarborough Township (without distinguishing the streams concerned), ten bridges were destroyed, and six others were closed because of the unsafe state of their approaches. Estimates of damage in that township were placed at \$500,000.

In the early evening of October 15th, a small stream near Markham caused a washout on the line of the Canadian National Railways between Markham and Stouffville, and derailed a locomotive, fortunately without loss of life;

two passenger coaches, containing some eighty passengers, remained upright. The Rouge River washed out the western abutment of the steel bridge, on the Canadian Pacific Railway line to Peterborough, just north of Steele's Avenue, causing one end of the bridge to fall into the river. The approaches to the village of Markham, both east and west, were flooded and the village marooned. Houses in low-lying parts of the village were surrounded by the flood waters of the Rouge; "waves washed into the homes" and some near the old Milne dam were swept completely away.

At Meadowvale Avenue, north of Sheppard Avenue, a bridge over the Rouge River was destroyed. At Unionville, a motor car became stalled in the rising waters on Eckhard Bridge; and in attempting to escape from the trapped car, one of the occupants, a boy of ten, was swept away and drowned. At Stouffville, streets were flooded, and traffic immobilized while an emergency squad worked to open the storm drains; a school was dismissed early in the afternoon of the 15th, when the basements became flooded. In Markham Township, there were a total of eleven bridges destroyed and three rendered impassable by washed-out approaches. The Rouge River rose, at the peak of the flood, to a height of fourteen feet. Damage to one property, the Rouge Valley Inn, was estimated at \$100,000.

At Green River, Duffin Creek cut a gap through Highway No. 7. At the village of Pickering, at least one family was compelled to abandon a home flooded by the waters of the creek.

For residents of the R.D.H.P. Watershed, the Hurricane Hazel floods must be ranked among the great disasters of their history.

Since 1830, on one or more of the streams of the R.D.H.P. Watershed, there have been sixty-nine floods recorded. There are indications sufficiently strong to warrant

CHECK LIST OF FLOODS

(1850 - 1956)

Key to the streams on which floods
were recorded, included in this list:

R : Rouge River
D : Duffin Creek
H : Highland Creek
P : Petticoat Creek

- 1837 - May 16. Note in the pass book of Peter Milne, Senior,
of Markham in his handwriting. (R)
- 1850 - April 5. Toronto Globe, April 6, 1850. Damage to
lumber. (R, H)
- 1869 - March 29. Toronto Globe, April 1, 1869. Damage to
mill-dam and to a bridge. (H)
- 1873 - April 10. Toronto Globe, April 11, 1873. Damage to
railway tracks at Port Union. (H)
- 1878 - February 22. Toronto Mail, and Toronto Globe,
February 23, 1878. (D)
- 1878 - September 13. Toronto Mail, and Toronto Globe,
September 14, 1878. Damage to bridges. (R)
- 1886 - March 22. Toronto Globe, March 23, 1886. Flood at
Pickering Village, damage not identified. (D)
- 1890 - June 5. Toronto Mail, Toronto Globe, June 7, 1890.
Damage to six or eight bridges; seven dams
destroyed. (D)
- 1919 - March 18. Toronto Mail & Empire, March 19, 1919.
Damage to dams (D), and to a bridge (R).
- 1920 - March 12-16. Toronto Globe, March 17, 1920. Dam
at Unionville destroyed. (R)
- 1927 - March 14. Toronto Globe, March 15, 1927. Water level
high, no damage identified. (D)
- 1928 - March 13. Toronto Globe, March 14, 1928; Toronto
Mail & Empire, March 14 & 15, 1928. At Pickering,
water over the highway. (D)
- 1929 - January 20. Toronto Globe, January 21, 1929. Water
level high, no damage reported. (R) At Pickering,
water over the highway. (D)
- 1929 - March 14. Toronto Globe, March 15, 1929. An "average
flood" (R); at Pickering, water over the
highway. (D)
- 1929 - April 7. Toronto Globe, April 8, 1929; Toronto Mail
& Empire, April 8 & 9, 1929. Damage to bridges. (R)
- 1930 - February 20. Toronto Globe, February 21, 1930. Water
levels high, no damage reported. (D, H)
- 1930 - March 8. Toronto Mail & Empire, March 10, 11 & 19,
1930. At Whitevale, Pickering Township, a man
drowned. (D)

FLOODS ON R.D.H.P.

- 1932 - February 11. Toronto Globe, February 12, 1932. Water level high, no damage reported. (D)
- 1934 - March 4. Toronto Globe, March 5, 6 & 7, 1934. Water levels high, but the ice did not break up, and no damage reported. (R, D, H)
- 1936 - March 11. Toronto Globe, March 12 & 13, 1936. At Pickering and Greenwood, water over the highways (D); in Highland Creek valley, one family evacuated (H).
- 1936 - March 27. Toronto Mail & Empire, March 28, 1936. Report of damage to Canadian National Railway tracks, possibly caused by waters of Duffin Creek (D)
- 1936 - December 31. Toronto Globe and Mail, January 1, 1937. Water level high, no damage reported. (D)
- 1937 - January 14. Toronto Globe & Mail, January 15, 1937. Water level high, no damage reported. (D)
- 1938 - February 6. Toronto Globe & Mail, February 7, 1938. Water level high, no damage reported. (D)
- 1939 - March 24. Toronto Globe & Mail, March 25, 1939. Water level high, no damage reported. (D)
- 1939 - April 18. Toronto Globe & Mail, April 19, 1939. At Pickering village, water level high, no damage reported. (D)
- 1942 - March 9. Toronto Globe & Mail, March 10, 1942; Toronto Star, March 9, 1942. At Pickering, water over the highway; ice jams and some damage on the Rouge River; water level on Highland Creek high, not overflowing. (R, D, H)
- 1942 - March 17. Toronto Star, March 17, 1942; Toronto Globe & Mail, March 18, 1942. Canadian National Railway bridges threatened between Markham and Blackwater; at Pickering, water over the highway. (R, D)
- 1943 - March 16. Toronto Globe & Mail, March 17, 1943. At Pickering, water over the highway. (D)
- 1944 - March 24. Toronto Globe & Mail, March 25, 1944. Water level high, no damage reported. (D)
- 1944 - July 19. Canadian National Railways Report, December 19, 1950. Railway tracks washed out near Gormley. (R)
- 1946 - March 7. Toronto Globe & Mail, March 8, 1946. Water level high, no damage reported. (D)
- 1947 - March 25. Toronto Globe & Mail, March 26, 1947. At Pickering, water level high, no damage reported. (D)
- 1947 - August 18. Canadian National Railways Report, December 19, 1950. On the Little Rouge, railway tracks washed out between Markham and Stouffville. (R)
- 1948 - March 16. Toronto Telegram, March 17, 1948; Toronto Globe & Mail, March 17, 1948. Damage to roads and houses. (D, H)

FLOODS ON R.D.H.P.

- 1948 - March 19. Toronto Globe & Mail, March 20, 1948;
Toronto Telegram, March 22, 1948. Water levels high,
no damage identified. (D, H)
- 1949 - January 19. Toronto Globe & Mail, January 20, 1949.
Damage to roads, houses isolated. (H)
- 1949 - February 15. Toronto Globe & Mail, February 15 & 16,
1949. At Pickering, water over the highway; in
Highland Creek valley, houses isolated, roads
washed out. (D, H)
- 1949 - March 22. Toronto Telegram, March 23, 1949. Water
over roads, no serious damage reported. (R, H)
- 1950 - January 26. Toronto Globe & Mail, January 27, 1950.
At Pickering, water over the highway; at Whitevale,
dam collapsed. (D)
- 1950 - March 8. Toronto Globe & Mail, March 9, 1950. In
Highland Creek valley, damage to roads and houses.
(H)
- 1950 - March 25-27. Toronto Globe & Mail, March 24 & 27,
1950; Toronto Telegram, March 25 & 27, 1950.
Damage to roads and houses; boy drowned. (D, H)
- 1950 - April 4. Toronto Star, April 4 & 5, 1950; Toronto
Telegram, April 4, 1950; Toronto Globe & Mail,
April 5 & 6, 1950. Damage to roads, bridges, and
houses. (R, D, H)
- 1951 - January 3. Toronto Telegram, January 4, 1951. Water
over roads and a bridge. (H)
- 1951 - February 12. Toronto Star, February 12, 1951; Toronto
Globe & Mail, February 13, 1951. Water level high,
threat of a flood; no damage reported. (H)
- 1951 - February 17-18. Toronto Globe & Mail, February 19
& 21, 1951. Water over roads, and surrounding
houses, in Highland Creek valley; relieved by
dynamiting an ice jam. (H)
- 1951 - March 30. Toronto Star, March 30 & 31, 1951; Toronto
Telegram, March 31, 1951; Toronto Globe & Mail,
March 31, 1951. Water over roads. (D, H)
- 1951 - April 12. Toronto Globe & Mail, April 13, 1951. At
Pickering, water over the highway; in the Highland
Creek valley, a bridge threatened. (D, H)
- 1951 - July 4. Toronto Telegram, July 5, 1951; Toronto
Globe & Mail, July 5, 1951. At Pickering, water
over the highway; in Scarborough Township, roads
washed out. (D, H)
- 1951 - July 16. Toronto Globe & Mail, July 17, 1951; Oshawa
Times-Gazette, July 17, 1951. At Pickering, water
over the highway; Petticoat Creek "assumed flood
proportions". (D, P)
- 1952 - January 15. Toronto Telegram, January 16, 1952;
Toronto Globe & Mail, January 18, 1952. Water
over the bridge, four homes isolated. (H)

FLOODS ON R.D.H.P.

- 1952 - February 4. Toronto Telegram, February 4, 1952; Toronto Star, February 4, 1952; Toronto Globe & Mail, February 5, 1952; Pickering News, February 8, 1952. At Pickering, water over the highway; in the Highland Creek valley, roads under water, families compelled to evacuate their homes. (D, H)
- 1952 - March 11. Toronto Telegram, March 11, 1952; Toronto Globe & Mail, March 12, 1952. At Pickering, water over the highway; in Highland Creek valley, water over the roads, three families compelled to evacuate their homes; ice jam on the Rouge River, dynamited. (R, D, H)
- 1952 - April 7. Toronto Telegram, April 7, 1952. In the Highland Creek valley, water over the bridge. (H)
- 1953 - February 21. Pickering News, February 27, 1953. Water level rose, one dwelling flooded; an ice jam dynamited. (D)
- 1953 - March 4. Toronto Telegram, March 4, 1953; Toronto Star, March 4, 1953; Toronto Globe & Mail, March 5, 1953; Pickering News, March 6, 1953; Dept. of Highways Report, March 4, 1953. At Pickering, water over the highway; in Scarborough Township, a new concrete bridge washed out. (D, H)
- 1954 - February 15. Canadian Press release in most Ontario dailies, February 16, 1954; Oshawa Times-Gazette, February 16 & 17, 1954; Pickering News, February 19, 1954. At Pickering, "annual spring flood"; in Highland Creek valley, water four feet over the Highland Creek Drive bridge. (D, H)
- 1954 - February 19. Oshawa Times-Gazette, February 20, 1954. Water level high, for the second time within a week. (D)
- 1954 - February 21. Toronto Telegram, February 22, 1954; Toronto Globe & Mail, February 22, 1954; London Free Press, February 22, 1954; Dept. of Highways Report, February 21, 1954. At Pickering, water over the highway. In Highland Creek valley, flood caused by an ice jam caused residents to evacuate their homes. (D, H)
- 1954 - August 23. Verbal reports received in the Dept. of Planning and Development from eye-witnesses. Dam in Whitchurch Township washed out. (R)
- 1954 - October 15. (Hurricane Hazel) Toronto Globe & Mail, October 16 & 18, 1954; Toronto Telegram, October 16 & 18, 1954; Toronto Star, October 16, 1954; verbal reports of eye-witnesses. Damage to railway tracks; damage to bridges; twenty houses destroyed. (R, H)
- 1954 - December 27-28. Toronto Globe & Mail, December 28 & 29, 1954. Damage to bridges, houses threatened. (H)
- 1955 - February 27. Toronto Globe & Mail, February 28, and March 3, 1955. Damage to bridges; 22 homes isolated. (H)

FLOODS ON R.D.H.P.

- 1955 - March 1. Markham Economist and Sun, March 3, 1955; Oshawa Times-Gazette, March 2, 1955; Toronto Globe & Mail, March 2, 1955; Pickering News, March 4, 1955. At Pickering, water over the highway; 12 families compelled to evacuate their homes. Rouge River "on the rampage", several houses threatened. In Highland Creek valley, flooding at The Willows. (R, D, H)
- 1955 - March 11. Toronto Telegram, March 12, 1955. At Pickering, ten families marooned; ice jam was dynamited. (D)
- 1955 - March 22. Toronto Telegram, March 22, 1955. At Willows Park, water level rising; threat of flood, but no report of actual damage. (H)
- 1956 - March 1. Toronto Star, March 2, 1956. Highland Creek Road, forty families marooned. (H)
- 1956 - March 7. Toronto Globe & Mail, March 7 & 8, 1956; Pickering News, March 9, 1956. At Riverside Drive, in Pickering Township, at The Willows, in Scarborough Township, and near the Rouge River bridge, water levels high, homes surrounded or threatened. (R, D, H)
- 1956 - April 4. Toronto Globe & Mail, April 5, 1956. At Pickering, water over the highway. (D)



Rouge River north of No. 7 Highway March 7, 1956, showing flats inundated by sudden thaw.



Rouge River south of No. 401 Highway. Ice floes passed safely and there was no serious flooding.



Rouge River south of No. 7 Highway. Periodically the river claims the flood plains and these areas should be restricted in use.

the assertion that floods have occurred on these streams with more or less severity as annual events since earliest times. In most years the spring floods appear to have been of moderate dimensions, but some have been of great severity. The earliest record is of a flash flood and in at least two years since 1850, flash floods on this watershed have been very severe.

2. Cause of Floods

Precipitation is the source of all stream flow and run-off and to a large degree determines the stream flow and flooding characteristics of the various rivers. Precipitation includes both snow and rain and during the winter months large volumes of water may accumulate in the form of ice and snow and then be released suddenly by a thaw. In addition to the precipitation and temperature factors there are many other factors which influence the amount and rate of run-off from an area. These factors are very complex and often vary from place to place and from time to time but, in general, they may be grouped into four classifications:

- (a) Geophysical, which are more or less permanent
- (b) Climatic, which are variable
- (c) Ice jams
- (d) Encroachments
- (a) Geophysical

The geophysical factors include the size and shape of the watershed and its orientation; surface slopes and stream gradients; nature of soils, whether pervious or impervious and their condition as to cultivation, vegetative cover, dry, wet or frozen; natural water storage areas such as lakes, ponds and swamps. Artificial factors such as storage reservoirs, farm drains, road ditches and urbanization with its buildings and extensive paved areas also influence run-off.

The lateral slopes and stream gradients of the R.D.H.P. Watersheds are comparatively steep and the soil types as previously indicated are largely pervious to semi-pervious. With the exception of the Duffin Creek area there are no natural water storage areas to speak of. There are several small "kettle" lakes and extensive swampy areas in the upper reaches of the Duffin Creek Watershed which tend to moderate the stream flows in this drainage system.

The orientation of drainage areas is an important factor which influences flooding. Fortunately for the watersheds under consideration here, it is such that it tends to reduce the flood hazard. With the drainage in general from a north to south direction, the lower sections of the rivers will lose their ice first thus allowing the ice floes from the upper reaches to pass out into the lake. In spite of this much of the flooding is due to ice jams.

The unfavourable influence of this factor is quite noticeable on the South Nation River which flows in a general north-east direction. The break-up often occurs in the upper reaches first and the ice floes pile up on the solid ice sheets in the lower river forming huge ice jams and causing widespread flooding.

Another factor which must be taken into consideration in determining the run-off characteristics of an area is the number of roads with their accompanying ditches. In this area there are at least 1,000 miles of roads many of which are paved with well maintained ditches and all of which considerably influence both the amount and duration of the run-off.

Without these artificial works the water would have to find its own way over the ground surfaces to the defined watercourses. This would normally be a slow process and much of the water would infiltrate into the ground. With the miles of ditches - 2 miles of ditch to each mile of road - that are maintained in conjunction with the roads the water is

quickly carried to the natural streams producing higher peak flows and reducing the amount of water that would normally sink into the ground to maintain the flows throughout the drier periods.

Another feature is the urbanization that has taken place and is expanding at a rapid rate throughout the area. With urban development approximately 25 per cent of the area becomes "hard surfaced" and the run-off naturally is increased accordingly. In the case of intensive residential, commercial and industrial development this percentage would be considerably higher and could be as much as 90 per cent or more.

(b) Climatic

These factors are extremely variable and the amount of flow in the rivers at any time is a direct result of the foregoing climatic conditions. As all stream flow originates from precipitation the amount, duration, intensity and extent of this factor are most important and are probably the most variable. The temperature - particularly the intensity and duration of freezing periods which permit the accumulation of precipitation in the form of snow and ice, cause the ground surface to freeze and produce large volumes of sheet ice on open water areas - to a large extent influences the volume of spring run-off and high flows which normally occur at this time. The relative humidity and the direction and velocity of winds are less important factors in this group.

Floods which almost invariably accompany the spring break-up were generally considered to be the most severe in Southern Ontario. The stream flow records indicate that they are certainly the most frequent and that the months of March and April are the most critical ones in this regard. However, with the advent of Hurricane Hazel and the floods which followed the passing of this storm it became evident

that "summer" floods due to heavy precipitation alone could be more severe than spring floods. The floods produced by this storm exceeded all known flood peaks for many of the streams in South-central Ontario and in some cases by as much as 4 or 5 times.

The peak flow of the Humber River was at least 4 times the previously recorded peak flow and the flow at Brampton on the Etobicoke Creek reached 5,000 c.f.s.* from an area slightly larger than 27 square miles.

It has been estimated that the average 48-hour rainfall over the Humber Watershed amounted to approximately 8.9 inches of which about 90 per cent ran off directly. Further it has been calculated that rainfalls of twice this amount could occur over areas of this size in Southern Ontario. This value is for the hurricane-type storms which normally occur in the late summer or early fall.

(c) Ice Jams

Ice jams result from an adverse combination of climatic and geophysical conditions and are an important factor in many of the floods in this area.

Large volumes of ice are formed in open water areas by freezing temperatures and later released when the temperature moderates. Usually the thaw is accompanied by rainfall and the ice is broken up by the rising water and large flocs are carried downstream by the current until they are caught by a snag, gravel bar, at a sharp bend in the river or at a narrow bridge opening. The ice flocs pile up upon one another and quickly become consolidated by the pressure of additional ice and impounded water.

Ice jams act as dams and the impounded water rises and overflows the adjacent properties. In this manner flooding may take place at moderate or even low stream flow and may be extended over a long period of time. Probably the best illustration of this was the 1886 flood on the Moira

* c.f.s. - cubic feet per second.

River at Belleville when ice blocked the river channel and the flooding lasted for 57 days. Also, flooding downstream is often aggravated when the jam breaks due to pressure or moderating temperatures and the water surges down boosting the peak flows.

Unattended mill ponds are particularly hazardous in this respect. Ice may form to a thickness of from two to three feet in still water of ponds and these massive floes will jam where the lighter stream ice would normally pass unobstructed. There are no mill ponds to speak of on the Highland Creek or Rouge River but there are several on Duffin Creek to which this would apply. If the ponds were drained in the fall the reduced ice formation would materially aid downstream areas which are troubled by ice jams and their attendant floods. Also, the spring flows would tend to flush out silt and debris accumulations and prolong the life of the pond area.

(d) Encroachments

Encroachments include all man-made works built in the natural flood plains of the river. The presence of these encroachments such as narrow bridge openings with their high approaches projecting out into the river valley, railway embankments, factories, houses and other structures not only aggravate the flood situation by retarding the flow and obstructing the normal passage of ice floes, but have actually created most of the existing flood problems, since there would be little concern at times of high water if these flats were unoccupied.

3. Remedial Measures for Flood Control and Low Flows

(a) Conservation Measures

The conservation measures employed to control floods and to increase low flows are the same and are complementary, namely:

- (1) Proper land use practices
 - (2) Reforestation
 - (3) Farm ponds
 - (4) Reservoir storage
- (1) Proper land use practices

With regard to conservation, proper land use practices have to do with such farming methods as tend to reduce surface run-off and soil erosion. Important among these are contour tillage, restricted crop rotation, winter cover crops, long-term pasture, diversion terraces, grassed waterways, etc. Contour tillage is ploughing furrows along contour lines or through points of equal elevation. With this method each furrow serves as a miniature dam, delaying the surface run-off and promoting infiltration which increases the soil moisture and raises the ground water table. Contour tillage also reduces the loss of vital topsoil by erosion and the subsequent silting of the stream channels. This method is generally satisfactory for the smooth regular slopes, but with the more irregular and steeper slopes it may be necessary to employ one or more of the other methods mentioned above to retard the run-off and hold the topsoil in place.

The Report of the Select Committee of the Province of Ontario on Conservation, which was submitted to the Legislative Assembly on March 15, 1950, stated:

"Water control must begin with a program of proper land use. Such a program requires the co-operation of a great many individuals over a period of years. This is a program which cannot succeed overnight. The first essential is to persuade every landholder that both his individual advantage and the public good, call for such a program. It is a fundamental recommendation of this Committee that:

'To reduce excessive water run-off which increases the flooding of river valleys, land use practices tending to soil waste, soil depletion and soil erosion must be discouraged and discontinued, and the farm-planning program set out in the chapter on soils in this report must be adopted and implemented'".

(2) Reforestation

The reforestation of marginal and submarginal land has an ameliorating effect on run-off. It retards run-off, checks erosion on all types of slopes, steep as well as moderate, increases low summer flow, and reduces silting.

The delay in snow melt due to a preponderance of forest cover, until a time when high temperatures and rain arrive, could intensify floods. However, there is no known record for any flood in Southern Ontario that might be attributed to this adverse effect of forest cover. The R.D.H.P. Watersheds have less than ten per cent of forest cover and any increase would benefit the flood problem in that, in relation to the cleared land, there would be a lag of a few days in the snow melt contribution. Trees also reduce the amount of water available for run-off by interception and evapotranspiration. These factors have little influence on the winter and spring floods but could substantially affect the summer flooding and adversely, the low flows to some extent.

(3) Farm Ponds

Farm ponds serve many purposes and are an asset on any farm. They provide water for farm stock, fire protection if located near the buildings, and a means of recreation for the family. Adults as well as children may enjoy the fishing, swimming, skating and boating. With landscaping, farm ponds can transform the appearance of the property.

A permanent stream, although desirable, is not necessary for a farm pond. They may be fed by a spring or by surface run-off alone, by using or enlarging a depression in the ground.

An informative booklet entitled "Farm Ponds" has been published by the Conservation Branch and is available to any owner who may be interested. It shows various types of ponds, none of which is expensive to construct and particularly

if all or part of the work is done by the owner. Ponds in sufficient number and properly regulated, could materially increase the summer flow. If the dams in small streams were substantially built, so as to withstand any spring flood, and were emptied prior to the freshet and properly regulated until the spring run-off was complete, they would help decrease flood flows to some extent. However, should the dams fail, they would have the opposite effect.

(4) Reservoir storage

The foregoing water conservation measures aid in reducing flood crests and increasing low flows, and are an integral part of the plan to remedy the problem. They require time and the co-operation of all landowners, however, and alone would not be sufficient. When strategically located reservoir sites are available at reasonable costs, reservoir storage provides the best solution to the flood and low flow problems. With adequate storage provided in a system of regulated reservoirs, a sufficient volume of the flood run-off may be impounded and controlled to the extent that flood crests may be lowered to a safe stage. In conjunction with some local improvement, the excess flood run-off can then be confined within the river channel at places subject to floods. Conversely, with the reservoirs full to the conservation storage level at the end of the flood period, the water may be released and low flows thereby increased to a reliable sustained rate, which will assure a dependable supply and adequate dilution of sewage effluent and industrial wastes. There are also other benefits. Lakes may be created for recreation, and the ground-water table raised in the vicinity, and to some extent downstream as well. The increased flow will restore fish life, and the waters will be safer for domestic use and recreation.

(b) Expedients

- (1) Channel improvement
- (2) Dikes
- (3) Diversions
- (4) Zoning

Channel improvement, dikes and diversions are classified as expedients and are not recommended when other conservation methods are possible and practical. Their only objective is to get rid of the water by providing an adequate channel through or around the trouble area. The benefits of such measures are only local and as they tend to increase the velocity of the flood waters they often aggravate the flood conditions at other trouble areas downstream. However, for reasons of economy, it is often necessary to resort to these expedient measures.

(1) Channel improvement

Channel improvement may require the widening, straightening, deepening and regrading the river channel through, and often for some distance below, the trouble area. It is usually necessary to protect the banks from erosion by rip-rap or other means which makes such work relatively costly.

(2) Dikes

Dikes are earth embankments with an impervious clay core located at or near the river, and built high enough to seal off the areas subject to flooding and confine the flood waters to the river channel. If the velocity is low and there is no danger of ice scouring, they may be protected against erosion by turf, otherwise it is often necessary to face the river slopes with stone or concrete. Pumping installations may also be necessary to pump out the internal drainage trapped behind the dikes.

Dikes should be provided with ample freeboard, be substantially built and maintained in good condition, for should they be topped or burst the damage could be greater than if they had not been there.

(3) Diversions

If reservoirs, channel improvement or diking are impracticable or ineffective, it is sometimes possible to detour the stream, or part of it, around the flooded area; or in some cases divert it to another watershed if the topography is favourable.

(4) Zoning

It is not feasible to extend flood protection to all localities through the construction of flood protection works nor is it economically possible to keep all railway lines roads, other services and even some housing projects beyond the reach of the flood waters and in many cases the present development of some areas prevents them from being reclaimed for the river.

As mentioned previously, probably the major reason for the flood problem in any area is the encroachment of the flood plain. Prior to flood "Hazel" there was little use made of any zoning power to restrict the use of areas subject to flooding. Practically all municipalities now have planning boards and a zoning ordinance to regulate the use of lands subject to periodic flooding is a feasible method of reducing flood damage and preventing the endangering of human lives.

Following flood "Hazel" in October, 1954, many of the more seriously affected properties were expropriated and it is intended that these lands will be restricted as park areas or for recreational use only, with no permanent buildings or other structures to be built within the flood plain. This program should be continued and any proposed encroachments in the future should be carefully considered before being permitted. Only those that are absolutely essential should be allowed and then only after the design has been studied from the standpoint of flooding and its probable effect upon the passage of flood flows.

CHAPTER 3

RESERVOIR STORAGE AND AVAILABLE RESERVOIR SITES

Storage in reservoirs is water conservation and is the measure normally recommended for flood problems when strategically located economical sites are available. When these conditions are negative, expedients such as channel improvement and dikes are considered. If the cost of such expedients is not justified by the existing land and property values, then the only alternative, unless left to their fate, is to purchase the trouble areas for parkland.

On the R.D.H.P. Watersheds reservoir sites for flood control are either too far downstream to be of benefit or the cost of the dams is prohibitive.

All the possible reservoir sites on the R.D.H.P. Watersheds have been investigated and those which appeared to be feasible were surveyed, in order that the Authority may be cognizant of their future possibilities for flood control and/or other purposes. The locations of the sites are shown in Fig. 1 and the reservoir and dam data of the surveyed sites are shown in Table 3. The contour plans of the sites have been prepared but are not included in this report. They are on file, however, and available for future use if and when required.

A brief summary of the storage possibilities in each of the R.D.H.P. Watersheds follows.

1. Available Reservoir Sites

(a) On the Rouge River

The only reservoir site of any size on the Rouge is immediately above No. 2 Highway. This site would require a high, expensive dam and would benefit only No. 2 and No. 2A Highways, the C.N.R. line crossings and some cottages located in the flats near the mouth of the river. A dam at this location is not considered to be justified and no survey was made.

Several smaller sites were investigated but were not considered to be of any significance in regard to the flood problem.

(b) On Highland Creek

There are two possible sites on Highland Creek, one on the West Branch near Bendale and the other on the Main Branch just north of the village of West Hill. The Bendale site has an estimated capacity of 2,000 acre feet but would not be justified because of the cost. Part of this site was being subdivided and therefore was not surveyed. The West Hill site is the best on the R.D.H.P. Watersheds. It has an estimated capacity of 13,600 acre feet, but the cost of this would also be excessive.

(c) On Petticoat Creek

There are no practical reservoir sites available on Petticoat Creek.

(d) On Duffin Creek

There are many reservoir sites available on this watershed and eight sites were selected for a more detailed study. The storage in all of these sites proved to be small compared to the height and length of the dams and the cost per acre foot of storage varied from \$491 to as much as \$2,734 or an average of about \$1,300 per acre foot as compared with \$126 and \$120 for the Fanshawe and Conestogo dams and reservoirs respectively. These unit costs for the Duffin Creek reservoirs are only approximate, since detailed designs, which are necessary for an accurate estimate, were not prepared.

It would be necessary to make "channel capacity"* tests to determine the amount of storage required to give protection against floods of a given magnitude but a comparison with the storage determined for other watersheds in Southern Ontario would indicate that about one half of the storage

* The "channel capacity" is the maximum stage or flow in cubic feet per second that the river can carry through a trouble area without overflowing its banks to the extent that property would be damaged.

available in these reservoirs, shown in Table 3, would be sufficient to give the trouble areas the necessary protection against floods approaching the magnitude of the 1947 and 1948 spring floods.

At present the cost of these dams for flood control is prohibitive and they may never be justified for that purpose alone. With the present rapid growth in this area, however, it is difficult to predict what the need for flood protection and stored water might be in say 25 or even 10 years' time. By that time, the population might be such that at least some of the reservoir sites would be justified for flood control and for the increase of summer flow to prevent serious pollution and enhance the general appearance of the streams. Some of the upper sites might be required to provide water for domestic and/or industrial use. They might also be required for recreational lakes in which case they could be used for flood control as well but not for increasing low flows as the water level of such a lake has to be kept more or less constant during the summer months. If the reservoirs were used for recreational purposes alone, the height of the dams could be much lower. The areas adjacent to three of the reservoir sites, namely: Dixie, Greenwood, and Pickering are included in areas recommended for purchase in the Recreation section of this report. If these sites are purchased and, if in later years, it is found that the use of impounded water is urgent, part of the areas could then be converted to that purpose.

In view of the uncertain future requirements of this area, it is recommended that the necessary lands for these reservoir sites might be purchased and reserved as park areas in the meantime. It is not likely that any of these flats or bottomlands would ever be approved for subdivisions, consequently their value per acre should be much less than local farmland. In later years should the plans be abandoned for any reason and sites are not wanted for any purpose they could then be sold.

TABLE III

DAM AND RESERVOIR DATA FOR SITES ON DUFFIN CREEK

Reservoir	D A M						R E S E R V O I R					
	Drainage Area	Length	Height Above Stream Bed	* Height Above Bedrock	Elevation G.S.C.			Spillway Capacity Not Less Than	Length	Average Width	Surface Area at Spillway Level	Holding Storage Spillway Level
					Bed of Stream	Top of Spillway	Top of Dam					
Sq. Mi.	Feet	Feet	Feet	Feet	Feet	Feet	c.f.s.	Feet	Feet	Acres	Ac. Ft.	
Altona	16.2	500	27	37±	898	920	925	6,500	6,000	700	38	256
Green River	49.3	1,150	37	47±	588	620	625	17,000	5,200	1,200	82	986
Whitevale	52.1	950	35	45±	540	570	575	18,000	5,900	700	70	603
Dixie 1	57.5	1,550	103	113±	398	495	501	19,800	9,000	1,000	240	8,900
Dixie 2	57.6	1,300	57	67±	388	440	445	19,800	5,600	900	87	1,920
Claremont	11.6	800	57	67±	718	770	775	4,700	3,200	1,000	83	1,440
Brougham	35.2	680	72	82±	378	445	450	12,100	9,600	1,000	249	6,800
Pickering	35.8	800	24	34±	356	375	380	12,300	3,000	800	82	756
Brock Road	4.3	3,100	22	32±	432	455	460	1,700	3,600	400	53	694

* Bedrock assumed 10.0 feet below bed of stream

CHAPTER 4

THE DEGREE OF FLOOD PROTECTION

The cost of providing the necessary protection for a "probable maximum flood" would be prohibitive. In the past the policy of the Department has been to provide for a hypothetical flood 1-1/3 times greater than the greatest flood on record, which for nearly all watersheds in Southern Ontario was the spring floods of 1947, 1948 or 1950.

The floods of October 15 and 16, 1954 which followed Hurricane Hazel are for many of the watersheds now the greatest floods on record. Since hurricane storms, or thunderstorms accompanied by heavy rainfall, may occur over any watershed in Southern Ontario and, according to meteorologists, may be of even greater magnitude than storm Hazel, it is now necessary to base measures for flood protection on floods resulting from these types of storms. As mentioned above, it is not considered economically possible to provide the required protection for floods of this magnitude but where protection is contemplated it is recommended that the work be designed for at least storm Hazel centred over the watershed.

The centre of storm Hazel passed over the Etobicoke and Humber Watersheds about 30 miles west of Markham on the Rouge. At the Snelgrove meteorological station 8.41 inches of rain in 48 hours was recorded. However, due to high winds during the most intense period of rainfall, the rain gauges did not catch all the rain and further, some of the more intense rainfalls occurred in areas where there were no gauges, and were not recorded. From reliable miscellaneous measurements obtained from washtubs and other large receptacles, it is estimated that the rainfall at the upper part of the Humber Watershed was about 10.9 inches and the average over the Humber Watershed 8.95 inches. Based on the rain catch shown in the official records, it is estimated that the average rainfall over the R.D.H.P. Watersheds was 4 inches.

Chapter 6 on Hydrology shows that if storm Hazel had centred over the Duffin Creek Watershed, the peak rate of run-off would have been 122 c.s.m.* Duffin Creek is the only stream on the R.D.H.P. which has a hydrometric gauge† from which the rate of surface run-off can be determined. Therefore the peak rates of run-off for flood Hazel for the other watersheds have been estimated by comparing their physical features with those of the Duffin Creek Watershed. The peak rates determined are: the Rouge - 166 c.s.m., Highland Creek - 97 c.s.m. and Petticoat Creek 168 c.s.m.

Owing to favourable soil forms these rates are not as great as those on the Etobicoke or Humber, but they are high, and it is evident that flood control measures to even this extent would be an expensive undertaking.

* Cubic feet per second per square mile of drainage area.

† Hydrometric gauges are being installed on Highland Creek and the Rouge River.

CHAPTER 5

COMMUNITIES FLOODED AND REMEDIAL MEASURES

Reservoir sites for flood control purposes are not available in the Rouge River and Highland Creek areas. The cost of the reservoir storage sites on the Duffin Creek area for flood control alone is prohibitive but, in the future, dams and reservoirs might be justified for other water uses in conjunction with flood control.

Several communities on the Rouge River, Duffin and Highland Creeks, are subject to periodic floods (Fig. 1) and excepting the Goodwood community the only reasonable measure for direct relief is channel improvement. With such high rates of run-off channel improvement alone is not practicable, but a combination of channel improvement and dikes would appear to be the most economical solution.

Where dikes are used they must be of sufficient height to prevent overtopping and be substantially built and well-maintained, otherwise the community behind them has a false security. Diking usually requires ditching for the internal drainage, pumping equipment to remove the water trapped on the land side and culverts through the dikes fitted with flap gates to permit drainage at times of normal flow.

Dikes often provide an economical solution to a flood problem but, on the other hand, they have undesirable features in that they disfigure the landscape and cut the community off from its riverfront.

One of the most persistent flood trouble areas is that of Riverside Drive on the East Branch of Duffin Creek. The Kilborn Engineering and Associates Ltd. made a survey of the area and reported on measures for overcoming the problem. However, the cost was beyond the means of those concerned and the scheme was not undertaken. Some minor channel improvement work was carried out but it was not sufficient as further flooding has since occurred. Similar surveys will be necessary for each of the other communities listed below before an

appraisal of the benefit-to-cost relation can be made. If the cost is not in keeping with the benefit, with the possible exception of the Goodwood community, it is strongly recommended that each of the areas be taken over by the Authority or respective municipality, as Scarborough Township is now doing with the Highland Creek Development and the Willows community.

The question of future subdivisions should be considered when making decisions on channel improvement for communities that are at present subject to floods. All plans of subdivisions have to be approved by the Community Planning Branch of the Department of Planning and Development before they can be registered. If there is doubt as to the possible flooding of low lands, the plans are submitted to the Conservation Branch for their approval also. The present policy is generally that all lots must have sufficient dry area for a residence and that, that area be at least 1 foot above the peak stage of storm Hazel centred on the watershed concerned.

Apart from the destruction of bridges and other public utilities the major areas subject to flooding are:-

1. Highland Creek
 - (a) The Willows Community
 - (b) The Highland Creek Development
2. Rouge River
 - (a) The Rouge River Community
 - (b) Other areas
3. Duffin Creek
 - (a) The Riverside Drive Community
 - (b) The Village of Pickering and vicinity
 - (c) The Goodwood Community

In the following descriptions of these trouble areas we acknowledge with gratitude the information received from the respective clerks of the municipalities concerning the assessed values of property and the frequency and the effects of floods.

1. Highland Creek

(a) The Willows Community

The Willows community is west of the village of West Hill on the south branch of Highland Creek, immediately upstream from the Lawrence Avenue bridge. It is flanked on the west by steep sand banks, but on the east by a flood plain through which the river twists and turns as it winds its way north to join the main stream north-west of West Hill.

During the past two decades many dwellings have been built on the flood plain, many of them near the river bank. They were built originally as summer homes, but owing to the demand for accommodation they have since been winterized and have become year-round dwellings.

Spring floods occur almost annually and are often aggravated by ice jams at the sharp bends in the stream. During the torrential flows of flood Hazel, owing to the sandy nature of the soil, the river changed its course undermining some of the buildings and a total of 17 were destroyed or severely damaged. This was not a new experience, as in the past many buildings in this area have been threatened in this manner and have had to be moved.

The land is under one ownership and the residents lease the land and put up their own buildings. The township of Scarborough has undertaken to purchase this property and assign it to a Green Belt or park land area.

The land has an area of 18.26 acres with	
an assessed value of	\$ 10,956
The total assessed value of the	
buildings is	<u>22,480</u>
A combined assessed value of	\$ 33,436

As of February 10, 1956, the township has purchased -

Land of an assessed value of	\$ 6,500
Buildings of an assessed value of	<u>11,790</u>
A total of	\$ 18,290

or 54.7 per cent of the property.

Highland Creek asserts its right to the flood plain nearly every spring.



Encroachment on the flood plain by buildings is an exceedingly dangerous practice and many of these buildings have now disappeared.

The photographs on this page were taken following the floods of April 1950. Erosion caused by Hurricane Hazel floods in 1954 was even more severe.



(b) The Highland Creek Development

The Highland Creek subdivision was surveyed in 1927 and lies astride the main stream just below No.2 Highway. Spring floods are an annual threat to this community and in some years three or four floods have occurred. The township of Scarborough is already acquiring for the Green Belt that part of the subdivision which lies in the flood plain. This includes a total of 458 lots and 74 buildings. As of February 10, 1956, 156 lots and 16 buildings have been purchased. The remainder to be purchased, viz., 302 lots and 58 buildings, have an assessed value of \$53,750.

2. The Rouge River

(a) The Rouge River Community - is located in Lot 34, Concession II of Pickering Township, on the Rouge River below Highway No. 401. The community consists of 17 properties, 5 of them being vacant land and 12 having buildings on them. They cover an area of 4.65 acres and the 1956 assessed value of the 12 properties, land and buildings, is \$ 9,855

and the 5 vacant properties 1,630

or a total assessment of \$11,485

Although this community was flooded for the first time by flood Hazel, spring freshets have been close to the flood stage on many occasions and steps should be taken to remove these homes from the flood plain.

(b) Other areas

In addition to the Rouge River community there are other areas where minor flooding occurs periodically. Also many private properties are often severely damaged, notable among which is the Rouge Valley Inn located on the Little Rouge, Lot 1, Concession III of the township of Scarborough. This is a private enterprise comprising a hotel, a picnic and amusement area and a swimming pool which has been in operation since 1946. The hotel has been extended on the north side of the creek and a concrete retaining wall

constructed on the south bank to protect the picnic area. The concrete dam, which joins the hotel and the retaining wall, forms the swimming pool. These structures confined the water to the channel which had not sufficient capacity to pass high flood flows.

During flood Hazel the dam and several small buildings were swept away. The hotel was badly damaged, the retaining wall breached and the picnic area flooded. The reconstruction which followed consisted of strengthening the foundation and wall of the hotel, strengthening and increasing the height of the retaining wall and building a dam with a larger spillway capacity.

The 1956 assessed value of the land (102 acres) is \$ 5,895
and the buildings 24,500
or a total assessed value of ... \$30,395

Under the present terms of The Conservation Authorities Act an Authority is not permitted to construct flood protective works on private property.

3. Duffin Creek

(a) Riverside Drive - is located on the East Branch of Duffin Creek about $\frac{3}{4}$ mile upstream from its confluence with the West Branch. The community is subject to periodic spring floods which are usually caused by ice jams in the lower part of the creek. The flood stage for Hazel was about the same as for spring floods but owing to the absence of ice the damage was small. There are 33 dwellings in the community, about half of which were flooded by Hazel.

Sharp bends in the river above Highway No.2 and the accumulated silt under the bridge cause ice jams and obstruct the flow. In 1955 the Department of Highways cased the approaches to and cleaned out the channel under the bridge at a cost of \$3,000. This, however, was a partial measure only. The firm of R. K. Kilborn and Associates Ltd., consulting engineers, was engaged by the Authority to make a survey

and report on flood relief measures and their approximate cost. In their report, dated October 19, 1955, they submitted 2 channel improvement schemes which extend from the upstream limit of Riverside Drive downstream to a point about 2,500 feet beyond No.2 Highway, a total length of about 1.67 miles.

In general the schemes are supplementary with Scheme "A", being part of Scheme "B".

The first, or Scheme "A", is designed to relieve flooding due to ice jams alone and consists of straightening and widening the present channel at a number of points. The second, or Scheme "B", is an enlargement of Scheme "A" and includes a dike system in addition to the above work. Scheme "B" would provide for a "normal maximum" flood flow of 3,800 c.f.s. which is approximately equivalent to the 1948 spring flood and that resulting from storm Hazel as it occurred over the watershed.

The rate of run-off provided for by the above work is about 90 c.s.m., or about 74 per cent of the peak flow if the October 14-15, 1954, storm had centred on the Duffin Creek Watershed. It may or may not take care of a flood the magnitude of that in the spring of 1948, which shows for the Pickering gauge a maximum mean daily flow of 3,470 c.f.s. Gauges are usually read once a day and this reading is accepted as the mean for the day. If the reading happened to be at the time of the peak, the design would be sufficient for floods of the magnitude of the 1948 flood. It is highly probable, however, that it was read at an off peak hour and that the peak might have been as high as 5,000 c.f.s. Ice jams when they break increase flood peaks, and may account for the high peak of the 1948 flood.

The area of the Riverside community is 33.07 acres. There are 33 dwellings in the community, the 1956 assessed value of land and buildings being \$41,365. Fifteen of these dwellings are periodically flooded and the assessed value of their land and buildings is \$14,640. The estimated

cost of the above work is \$127,250 for Scheme "B" and \$88,750 for Scheme "A" exclusive of land costs. These figures include a cost of \$41,150 for stream bank protection which would be necessary to maintain the new channel alignment.

On the basis of the present real estate values such expenditures are not warranted particularly in view of the hazardous position of the settlement in the event of a major flood.

(b) Village of Pickering and Vicinity

On Duffin Creek, between No.2 Highway and the westerly limit of the village of Pickering, there are 20 properties, 14 with dwellings on them which are subject to floods. There are also 5 properties, 3 with buildings on them, just downstream from the village limits, which are similarly flooded. Above the village the lots or parcels of lots, as the case may be, vary from 0.15 to 4.3 acres. Within the village 4 of the properties have an area varying from 0.5 to 5.7 acres, with one being a block of 23.6 acres.

The area flooded and the assessed value of land and buildings are shown below.

	Area Acres	1956 Assessed Value-Dollars		
		Land	Buildings	Total
From No.2 Highway to the westerly limit of Pickering Village	75.56	15,410	27,455	42,865
Village of Pickering	32.80	2,830	6,335	9,165
Total	108.36	18,240	33,790	52,030

The work proposed in the Kilborn report for the Riverside community extends 2,500 feet below Highway No.2. This portion of the work which consists of removing the sharp bends and cleaning the existing stretches of the river channel would help to relieve the flooding due to ice jams, which is the major cause of flooding in this area, but would not solve the problem.

Extensive channel improvement would be required to provide complete protection and cannot be justified in view of the small amount of flood damage experienced in the area.

Further partial protection might induce further development of the area which would greatly increase the amount of damage with the possible loss of lives in the event of a major flood.

(c) The Goodwood Community

The village is located on Highway No.47 at the crossroads between Concessions II and III of the Township of Uxbridge at the headwaters of Duffin Creek. It is near the boundary between the watersheds of Duffin Creek and Pefferlaw Brook and is unique in that it lies in a depression which has no apparent drainage outlet, and consequently the community has always been troubled with flooding.

(1) Frequency and effect of floods

Except for storm Hazel, which caused some flooding, there have been no floods caused by summer storms. However, floods occur at nearly every spring break-up. The flooded area in the depression averages more than a foot in depth and fills cellars to about the first floor level. It usually takes six weeks, and at times ten weeks, for the water to evaporate and seep away. After the 1950 spring flood, a boat serviced one of the streets for nearly two weeks. Septic tanks and wells are flooded and contaminated. Raw sewage is sometimes visible, and on one occasion it is reported that the water surface was covered with algae. Although so far no epidemics have been known to result from this condition, it is evidently a health as well as a flood problem.

Engineers were engaged about 1910 and again in 1950 and 1955 to investigate the problem and report on relief measures. In each case they considered any satisfactory solution to be too costly an undertaking and no action was taken. It may still be so. This Department made an extensive field survey during the summer of 1956 and from this survey is able

to submit two schemes with estimated costs for consideration.

(2) The survey and data obtained

The area was photographed and plans were prepared by The Photographic Survey Corporation Limited at a scale of 100 feet to the inch (Figure 3) showing $2\frac{1}{2}$ -foot contour intervals. The Department had a survey party at Goodwood for about two weeks making ground surveys to determine the outline of the drainage area of the depression and that of the flooded area and other data shown on the above figure.

The depression has a drainage area of 380 acres, and according to the Township clerk there are 60 houses in the Goodwood community, with an estimated population of 250.

The flooded area covers 45.5 acres, has 23 dwellings and a population of 98. For the year 1956 these properties were assessed for \$44,790, which is about one-fifth of the actual value.

About 80 acre feet* of water is impounded during periods of flood and, according to the evidence of residents, accumulates in two to three days. However, one resident claims that serious flooding has accumulated in one day. This man works for the railroad on a night shift and says for one spring flood he saw no flooding when he went to work but when he returned the next day after working a 24-hour shift he had to wade to his house in rubber boots. It is quite possible, however, that flooding had started and he did not notice it, and that when he returned home the water had not reached its highest level.

The time of accumulation of the impounded water is necessary for the solution of the problem. The Department is arranging to have observers time the flooding at the 1957 freshet in one-foot stages from the beginning of the flooding until it has reached its highest level. In the meantime, for this estimate the worst condition has been assumed, viz., the accumulation of 80 acre feet of water in one day.

* An acre foot of water is 1 acre in area and 1 foot deep.

(3) Solution

An estimate has been made for two schemes, viz:

a an open ditch

b a pipeline and pumping

Scheme a

The existing ditches in Goodwood would be regraded to flow to the south-east angle of the intersection of the C.N.R. and county road between Lots 15 and 16. The ditch would start at this point, thence westerly along the southerly side of the C.N.R. right-of-way, a distance of about 2,200 feet, thence southerly following a draw through a wood-lot about 1,800 feet, or a total length of 4,000 feet, to an elevation which would drain off the flooded area. From this point the water, with some light ditching, would follow a natural drainage course for about a mile southerly to a permanent stream. The cut along the C.N.R. stretch would have a maximum depth of 29 feet. The excavation is believed to be mostly lenses of fine sand and clay which would require 2:1 side slopes.* A 48-inch galvanized pipe could be laid in 1,050 feet of the deeper section of the cut and back-filled. The excavation for the piped section could have steeper side slopes, and it is estimated that the saving in excavation would pay for the pipe provided it could be back-filled as the pipe was laid.

The cost of this scheme is approximately \$85,400, which is prohibitive.

Scheme b is a pumping project.

Assuming that the accumulation of 80 acre feet of water would be 1 day, it would be too expensive to attempt to remove it the same day. It is proposed, therefore, to pump if necessary for 5 days, which would mean that there would be some flooding during that time. If, however, this accumulation took 3 days, it would probably be pumped off with no flooding.

* Two feet horizontal to 1 foot vertical.

The project would comprise a 200 horsepower motor and pump which would be capable of pumping about 9 c.f.s. or 3,500 gallons of water per minute through a 12-inch cast iron pipeline 1,470 feet long buried in a trench 4 feet deep. The location of the proposed pumphouse and pipeline is shown on Figure 3. The water would be pumped from a 6' x 6' x 9' deep concrete-lined sump or well provided with a trash screen. The pumping installation would be housed by an 8' x 10'8" x 8' high prefabricated metal structure.

There would be an open ditch with a 3-foot bottom and 700 feet long along the fence from the county road to the pumphouse which would drain the adjacent land and convey the water to the pumphouse at low stages. The ditch would also contain without flooding the water in the pipeline between the summit and the pumphouse which would return if it were necessary to empty the line.

A stilling basin structure would be placed at the end of the pipeline to dissipate the energy and prevent erosion from the discharge.

The estimated cost of Scheme b, which includes 20 per cent for engineering and contingencies, is \$33,000. Assuming that the pump would be used once a year only and not more than five continuous days (it would probably average less), the operating cost, maintenance and depreciation are estimated at \$500 per year.

It is not expected that the discharge would aggravate flood conditions downstream, as it is believed that flows would have passed their peak in the southern part of the river by the time pumping was started at Goodwood.

CHAPTER 6

HYDROLOGY

1. Precipitation, Stream Flow and Run-Off

The drainage areas of the R.D.H.P. Watersheds, as all other river drainage areas, are subject to the basic complexities involved in the study of the relationships between precipitation and run-off which, in turn, are contingent upon the amount of reliable and pertinent data available.

For this region, the two most important items of data, precipitation and stream flow records, though pertinent and reliable, have only been recorded over a relatively short period of time and may not show the extreme characteristics desirable.

(a) Precipitation measurements available from a number of stations in the vicinity, with varied length of record, indicate an annual average of approximately 30 inches.

This is comparable with the measurements for other Lake Ontario regions from Hamilton to Belleville, with periods of record ranging from 27 to 112 years which show average annual precipitation amounts of from 29.4 inches to 32.0 inches. Mean annual temperatures throughout the same regions vary from 43 to 46 degrees Fahrenheit.

(b) Stream flow data for the drainage areas of the R.D.H.P. are available for only the Duffin Creek area, where a hydrometric station was established on No. 2A Highway bridge at Pickering in 1946. The drainage area above this point is 112 square miles.

Observations are made once daily usually, with hourly readings taken occasionally during spring freshet period or at other times when instructions may be issued to that effect.

Table 4 shows the maximum and minimum mean daily and mean monthly flows at the gauge for the entire period of record and Fig. 4 shows the hydrographs for the same period.

DUFFIN CREEK AT PICKERING

MAXIMUM AND MINIMUM MEAN DAILY AND MEAN MONTHLY FLOWS IN CUBIC FEET PER SECOND

Drainage Area 112 Sq. Miles

TABLE 4

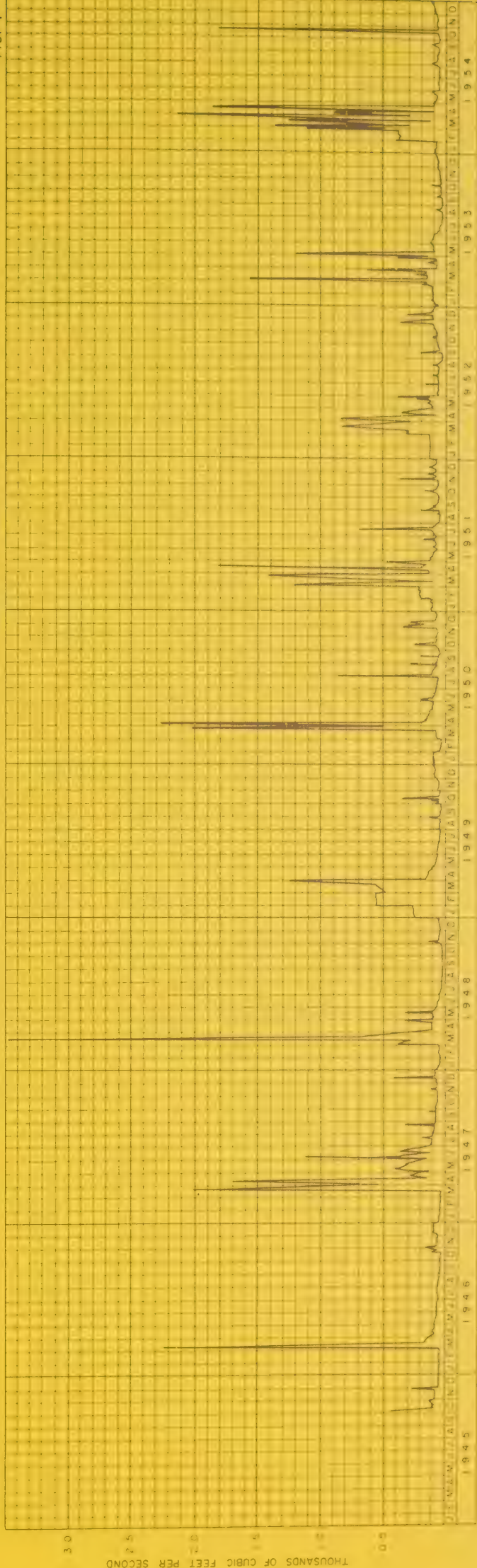
YEAR	OCTOBER			NOVEMBER			DECEMBER			JANUARY			FEBRUARY			MARCH			APRIL			MAY			JUNE			JULY			AUGUST			SEPTEMBER			
	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean				
1945-46	435	60	102	253	59	84	—	—	—	—	—	—	—	—	—	2,230	75	433	132	54	70	95	52	64	98	34	52	35	42	53	35	41	84	35	48		
1946-47	158	37	57	88	52	59	—	—	—	—	—	—	—	—	—	1,990	—	—	1,670	97	338	450	84	118	1,210	74	162	370	60	101	302	60	83	133	59	69	
1947-48	88	59	68	109	67	77	392	—	—	—	—	—	—	—	—	3,470	148	542	314	65	117	314	54	81	—	—	—	—	—	21	27	6	18	20	29	29	
1948-49	67	27	46	140	53	62	—	—	—	—	—	—	—	—	—	541	167	465	162	64	119	49	24	38	35	14	23	58	12	19	115	13	26	242	15	38	
1949-50	331	27	58	75	26	52	—	—	—	—	—	—	—	—	—	2,020	—	259	2,240	108	273	97	65	81	192	48	64	858	28	73	258	26	58	138	29	54	
1950-51	222	29	74	325	55	103	—	—	—	—	—	—	—	—	—	1,430	—	285	1,820	117	280	107	66	82	174	38	58	692	44	105	69	22	35	198	25	42	
1951-52	153	39	56	364	45	104	—	—	—	—	—	—	—	—	—	—	—	351	840	81	238	362	49	104	145	33	52	102	26	47	115	18	52	181	21	56	
1952-53	106	44	58	357	45	94	—	—	—	—	—	—	—	—	—	1,520	70	210	358	53	79	1,260	37	126	136	20	59	38	8	18	87	0	15	80	0	17	
1953-54	121	18	42	85	36	50	—	—	—	—	—	—	—	—	—	2,140	76	291	1,850	66	225	101	35	64	66	37	52	34	22	34	125	26	46	109	32	58	
1954-55	1,830	37	230	—	—	140	—	—	—	—	—	—	—	—	—	—	—	330	—	—	170	—	—	—	—	—	—	—	—	—	—	—	—	—	—	35	—
Average	351	38	79	199	49	82	328	—	—	—	—	—	—	—	—	2,004	107	352	1,043	76	191	315	52	82	257	37	61	277	29	50	128	23	41	136	26	45	

HYDROGRAPHS

MEAN DAILY FLOWS DUFFIN CREEK AT PICKERING

Mean daily flows plotted from records of the Water Resources Division, Dept. of Northern Affairs and National Resources, Ottawa.

FIG. 4



(c) Run-off or stream flow is that portion of precipitation that finds its way to natural or artificial channels either as surface flow or as subsurface flow resulting from infiltration and deep seepage.

The factors affecting run-off are numerous and varied, but may be generally classified under two headings, (i) precipitation and (ii) watershed characteristics.

Precipitation is the most important since it is the source of all stream flow. In many areas there are sufficient reliable data available for generalized estimates of this factor but on the whole additional precipitation recording stations are required for an accurate evaluation of the precipitation to run-off relationships.

Watershed characteristics are numerous and varied, and appear in so many combinations, that it is difficult to classify or rank them in any order in relation to their direct effect on run-off.

If quantitative results only are desired, as in the case of flood control, the best means available is to measure the run-off directly by the use of hydrometric gauges at strategic locations. Stream flow is the resultant of all the characteristics of the watershed and while it indicates the combined effect of the various features on the precipitation which falls on the area it does not indicate the effect of any one factor.

The amount of surface flow or direct run-off is of greatest concern to conservation in general and particularly to flood control, as this is the basis for design of all structures. In flood control work it is not the ordinary or average flows that determine the design but the unusual or exceptional flow that may have occurred in the past or might reasonably be expected to occur in the future.

2. Maximum Flows

(a) Spring Freshets

By examination of the flow records and hydrographs of the gauge at Pickering on Duffin Creek, it is obvious that the maximum flows for this area have occurred during the freshet periods. Until recently, this has been the case generally throughout all Southern Ontario watersheds, except in isolated cases concerning small areas, since systematic hydrometric records have been kept.

There are references to floods in other seasons earlier in this report, but the data available are not sufficient to determine the actual magnitude of the flows. Most of the early flood references are eye-witness accounts or hearsay and are difficult to evaluate. Also the changing conditions make the comparison of these earlier floods with present-day flows very difficult and any conclusions therefrom unreliable. On the other hand, they cannot be ignored and must be considered in development of any area where they may have occurred.

The maximum flow recorded for the Duffin Creek area occurred on March 19th, 1948, and is 3,470 c.f.s.* This is a mean daily flow and it is quite probable that the peak was considerably in excess of this.

During the period for which records have been kept for the gauge at Pickering, there have been a few occasions during freshets when observations were made at lesser time intervals than the normal once daily readings. On these occasions it is presumed that observations were obtained at or near the peak of the flood and the following table shows the relationship between the mean daily flow and the actual peak flow.

* c.f.s. - cubic feet per second.

RATIO OF PEAK TO MEAN FLOW

Date	Peak c.f.s.	Mean c.f.s.	Ratio $\frac{\text{Peak}}{\text{Mean}}$
1954 - Apr. 16	2,632	1,640	1.605
1953 - Feb. 21	2,472	1,970	1.255
1953 - Mar. 4	2,940	1,524	1.929

It can be seen from the above table that there is little consistency in the ratio of peak to mean flows. However, this would be modified with a greater number of observations, over a longer period. This inconsistency may be attributed, in part, to a variety of conditions of which the more obvious are:

(1) The season of the year, with its attendant complex conditions of snow, ice formation, ground conditions, etc.

(2) The river stages, which may be affected by ice or backwater, or both, and the possibility that the actual peak flow may not have been observed.

If the minimum ratio were applied to the maximum recorded mean daily flow of 3,470 c.f.s., the estimated peak flow for the March 1948 flood would be:

$$3,470 \times 1.255 = 4,355 \text{ c.f.s.}$$

Taking the average of the ratios shown as 1.596 or 1.6 and applying this to 3,470 c.f.s. the estimated peak flow for this flood would be: $3,470 \times 1.6 = 5,552 \text{ c.f.s.}$

It appears reasonable to assume that the peak flow for March 19th, 1948, was approximately 5,000 c.f.s. or 45 c.f.s. per square mile.

(b) Other Than Spring Freshets

There have been floods recorded at other seasons than spring, that show flows of considerable magnitude. From the number selected two occurred in October, one in June and one in July. These are shown in the following table together with the average depth of rainfall over the area and the

resultant run-off and the ratio of run-off to precipitation expressed as a percentage. In determining the percentage run-off the base flow was subtracted in each case since this portion of the run-off would not be attributable to the rainfall which immediately preceded the run-off period being considered.

SEASONAL PRECIPITATION AND RUN-OFF
FOR SELECTED STORMS, OTHER THAN SPRING

Date	Discharge Max. Mean Daily c.f.s.	Rain Inches on Area	Run-off Inches on Area	Run-off %
October - 1949	331	1.2	0.13	11
October - 1954	1,830	3.5	1.095	31
June - 1947	1,210	2.57	0.487	19
July - 1950	858	1.85	0.32	17

The run-off factor is most uncertain and varies widely with the degree of perviousness of the watershed area, the season of the year, the general climatic conditions, previous precipitation, rainfall intensity, etc.

Since there are not sufficient basic data available to arrive at any conclusive run-off factor in view of the number of assumptions that are necessary in developing basin hydrographs for forecasting or design studies, it was felt that a more refined analysis was unnecessary. Therefore, the methods of hydrograph separation and rainfall distribution used to establish the run-off factors shown, were considered satisfactory for the purpose of this report.

3. Storm of October 14-15, 1954

As shown in Fig. 4 the maximum recorded flow on Duffin Creek occurred on March 19, 1948.

However, the storm which is considered most significant in relation to run-off and design and which caused exceptional damage and excessive run-off over a wide area, occurred in October, 1954.

The rainfall resulting from the storm of October 14 and 15, 1954, and known as Hurricane Hazel was much less on the R.D.H.P. Watersheds than experienced on the Humber River Watershed located some 30 miles to the west, and over which the storm centre passed.

However, the rainfall was widespread and meteorological stations in the vicinity of the R.D.H.P. areas reported amounts as tabulated below. These are the officially recorded amounts of the Climatology Section, Meteorological Division, Department of Transport.

Station	Oct. 14 Inches	Oct. 15 Inches	Total (48 hrs.) Inches
Oak Ridges	1.50	3.40	4.90
Uxbridge	0.60	3.27	3.87
Willowdale	1.66	3.77	5.43
Agincourt	1.28	3.33	4.61
Wexford	0.49	3.50	3.99
West Hill	0.35	2.86	3.21
Rouge Hills	0.26	2.92	3.18
Green River	0.69	3.10	3.79
Oshawa	0.28	1.37	1.65

The average depth over the combined areas of the R.D.H.P. would be approximately 4.0 inches. From the isohyetal map of the area, the following figures were interpolated for the individual drainage areas.

Area	Average Depth in Inches (48-hour Total)
Rouge	4.3
Duffin	3.5
Highland	4.0
Petticoat	3.5

The maximum mean daily discharge recorded on Duffin Creek for this storm was 1,830 c.f.s. with a peak flow of 3,680 c.f.s. The peak was computed by relating a high water mark left by the flood to the gauge reference and thence determined from the extended rating curve. The run-off factor determined for the Duffin Creek area from these figures was approximately 31 per cent.

Though this storm as it occurred did not produce a discharge greater than the previously recorded March 19, 1948, flow, it is obvious that such a storm could have centred over the R.D.H.P. areas, with results as devastating as experienced elsewhere.

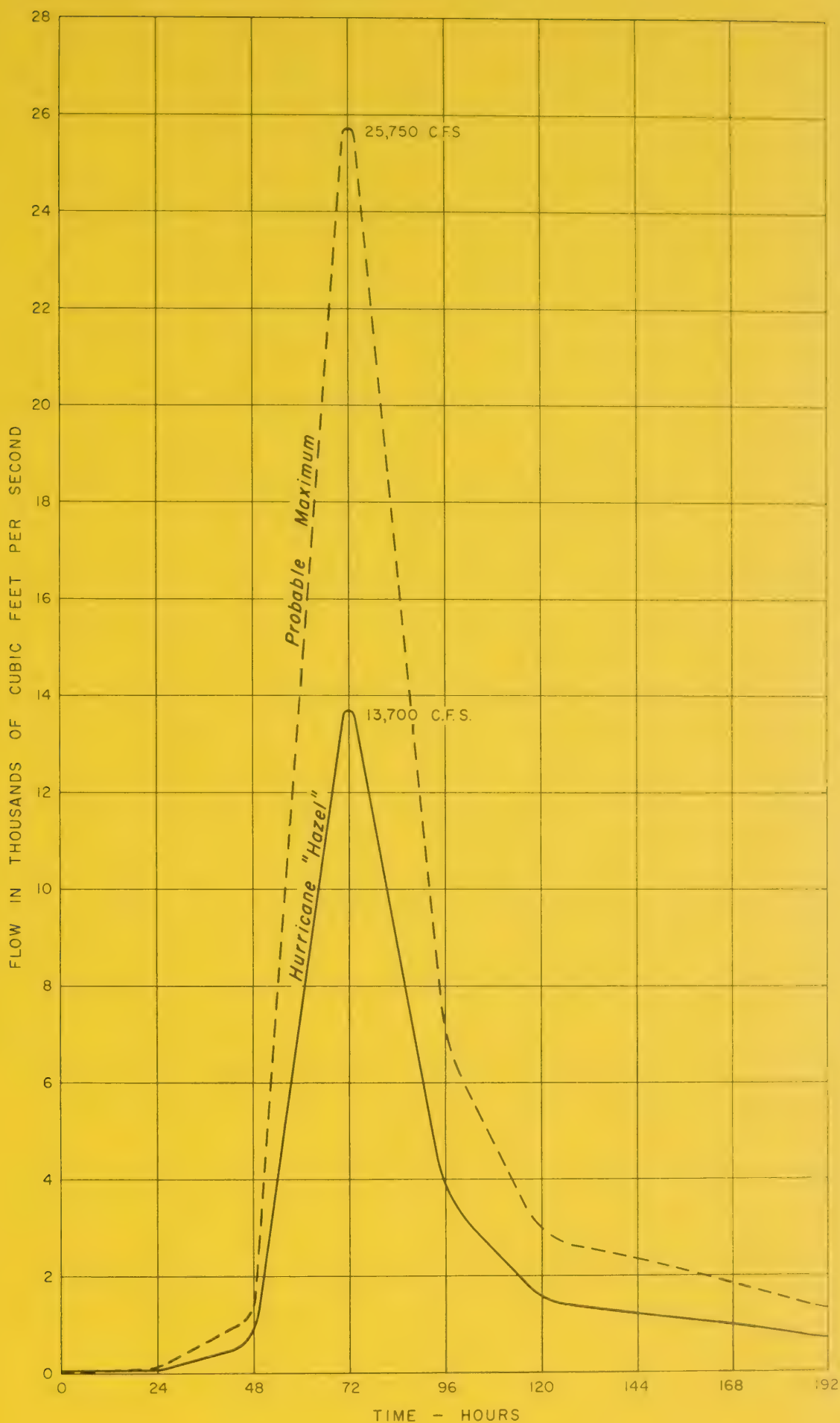
4. Hazel Centred on Duffin Creek Area

To construct a hydrograph for storm Hazel centred over the area of Duffin Creek, the unit-graph method was used as this best suits the circumstances when considering run-off resulting from rainfall alone. As there are not many years of hydrometric records available, the number of storms available to meet the requirements of the method were few. However, of those available a reasonably close correlation was indicated and an average graph was computed and the resulting ordinates used to determine the hydrograph resulting from a storm such as Hazel.

The probable hydrograph for Hazel and that for the probable maximum precipitation by the unit-graph method are shown in Fig. 5.

From a depth - area analysis, for a 48-hour period, of storm Hazel it is indicated that a total of 10.1 inches of rain could have fallen on an area of 112 square miles. This figure was used to construct the probable hydrograph that would have resulted from such a storm over the Duffin Creek area.

The most unsatisfactory part of the application of the unit graph method is the determination of the run-off



HYDROGRAPHS

DUFFIN CREEK AT PICKERING

DRAINAGE AREA 112 SQ. MILES

showing

**Hurricane "Hazel" and Probable Maximum
storms centred on the watershed.**

Determined by unit-graph method based on mean daily flows

Hurricane "Hazel" 10.1 ins. of rain — 75% run-off

Probable Maximum 16.8 ins. of rain — 85% run-off

FIG. 5

percentage, with particular reference to the season of the occurrence. From the few storms available for determination of a run-off factor, the maximum indicated was 31% which resulted from Hazel as it actually affected this area.

Eight hydrographs of those available for the month of October, and resulting from rain only, varying in amounts from 0.5 inches to 3.5 inches were separated, and a net run-off increment determined for each. The resulting run-off factors varied from 2% to 31%.

The variation was not in direct proportion to the rainfall amounts due to the variables, the influence of the numerous factors affecting run-off, the chief ones being the antecedent rain and soil conditions, rainfall intensities, distribution, etc. The resulting run-off plotted against rainfall and extended to include 10.1 inches indicated a run-off of 6.6 inches or 65%.

This run-off figure of 65% may appear low, when an amount of rainfall such as 10.1 inches on a small drainage area of 112 square miles is considered. However, a partial agreement may be reached by an examination of Table 1, which shows the predominant soil types, in terms of their pervious and impervious qualities and distribution.

On the Duffin Creek area, the area of pervious soil which has absorptive capacity and is conducive to infiltration and percolation, is approximately 36% as against impervious of 20%. In between there is the drumlinized till plain area of approximately 44%, which also has tendencies of retention. Over all, it appears that the area would not contribute much more than 65% to run-off in the event of a storm such as 'Hazel' but as an added safety factor, 75% would appear to be a reasonable percentage for storms of this magnitude.

Applying this factor (75%) to the computed unit-graph for the area, a peak flow of 13,700 c.f.s. would result which is equivalent to a run-off rate of 122 c.f.s. per square mile.

5. Probable Maximum Precipitation

From Preliminary Estimates of Probable Maximum Precipitation over Southern Ontario*, for an area of 112 square miles, an amount of 16.8 inches for a 48-hour period is indicated. For a storm rainfall of such proportions it is likely that the run-off factor would approach 85 to 90%, particularly in consideration of the amount and intensities involved and the possible antecedent conditions which may exist at the time such a storm might occur.

An arbitrarily chosen run-off factor of 85% for the Probable Maximum Precipitation would appear to be reasonable for purposes of project design. By applying those quantities in the same manner as for Hurricane Hazel, the resulting peak flow would be 25,750 c.f.s. or 230 c.s.m.

It should be pointed out that the above run-off ratios are based on the watershed area in its present state. As previously mentioned the further development of the area could materially alter these ratios and this feature of the area would necessarily have to be re-assessed when future work is considered. However, with the stream flow gauge now in operation the continuous records will indicate any long-term trends in this regard and the factors may be adjusted accordingly.

6. Other Areas Within the Authority

Up to this point the only area considered in the hydrology studies was Duffin Creek, as this is the only area having records of stream flow. The remaining areas to be considered are:

<u>Area</u>	<u>Drainage (sq. miles)</u>
Rouge River	129.7
Highland Creek	39.4
Petticoat Creek	10.4

* Study by J. P. Bruce, Hydrometeorologist seconded to the Department of Planning and Development from the Meteorological Division, Department of Transport.

All the areas, including Duffin Creek, within the Authority, are adjacent to one another and the combined areas cover 310 square miles.

The climatic elements over these areas are similar in nature, except for time and distribution, with particular reference to the unusual storms such as severe thunderstorm or hurricane-type precipitation, which may be of short duration and concentrated on relatively small areas.

The development of synthetic hydrographs was considered for these areas but, on investigation it was found that basic data essential to the application of any synthetic method were not available.

The only means available, therefore, is a comparative analysis of the basic characteristics of the areas concerned in relation to the adjacent Duffin Creek area for which some basic data were available, using any empirical or rational formulae that may appear relevant to produce estimates of stream flow and run-off quantities.

Table 1 shows the soil types and the degree of perviousness in proportion to the area, the river gradients and drainage areas. A purely arithmetic treatment of these quantities, in terms of their relationship to the Duffin Creek area, was developed in two steps.

(a) Soil types and river gradients.

(b) Drainage area size.

(a) Soil Types and River Gradients

The nature of the soils, the land slopes and river channel gradients have a marked effect on run-off, but do not always combine to contribute to the same result.

In the case of pervious soils and flat gradients the effect would be to retard run-off, while the opposite of these features would tend to increase the run-off. On the other hand, a combination of pervious soils with steep slopes or impervious soils with flat slopes would tend to offset one another and moderate the run-off.

Through a comparison of these features for each of the areas and for which reasonably accurate data are available, the following table was determined.

RATIOS
RELATIVE TO SOIL TYPES AND GRADIENTS

Rouge	Duffin	Highland	Petticoat
1.37	1.0	0.70	1.03

(b) Drainage Area Size

The size of drainage area is probably the most important of all the characteristics affecting run-off since it is the area that determines the amount of rainfall that is caught, a portion of which ultimately appears as stream flow. Normally the intensity of the rainfall varies inversely with the size of the watershed area.

The size factor is considered by many to be so important that in the numerous run-off formulae used as standard practice, it is the only variable, other characteristics being represented by constant factors or ignored.

The shape of drainage area also has an effect on run-off, mainly because of the distribution of its various tributary channels and their capability of concentrating run-off from all areas of a watershed. Also the slope and the relatively important time elements must be taken into consideration.

The best known and probably most used formula which takes into account the drainage area variable is that by Fuller. However, this formula was devised primarily to arrive at momentary peak flows from mean daily flows. Assuming that the hydrograph shape is well defined by the recorded mean daily flows, with the exception of the actual peak; and as we are mainly concerned with the peak, it appears logical that Fuller's formula could be applied to show the relationship of drainage area size to the peak flow, and consequent peak rate.

The following table shows the relationship of drainage areas to Duffin Creek in terms of Fuller's formula.

PEAK FLOW RELATIONSHIP
BASED ON DRAINAGE AREA VARIABLE BY FULLER

	Rouge	Duffin	Highland	Petticoat
Area Sq. Miles	130	* 112	39	10
Fuller's Increment	1.464	1.476	1.667	2.0
Ratio	0.99	1.0	1.13	1.35

* Drainage area above Hydrometric Station.

By applying these ratios to the peak rate of run-off for storm Hazel already obtained for the Duffin Creek area approximate estimates of peak flows and peak rates of run-off for the other watershed areas were determined.

The estimated flows are shown in the following table.

ESTIMATED FLOWS
RESULTING FROM "HURRICANE HAZEL" CENTRED ON AREA

Area	Sq. Miles	Peak c.f.s.	Rate c.s.m.	** Rainfall Inches (48 hours)
Rouge	130	21,580	166	10.0
Duffin	* 112	13,700	122	10.1
Highland	39	3,940	97	10.7
Petticoat	10	1,680	168	11.1

* Drainage area above Hydrometric Station.

** Depth-area analysis Hurricane Hazel.

The foregoing estimates of potential run-off for the Rouge, Highland and Petticoat areas, are not conclusive and are presented here as a guide only, until such time as stream gauges can be established.

The method of application of the data available is based on assumptions, which are not constant in relation to the numerous variable conditions which may exist on any drainage area at different seasons.

However, it is felt that the quantities presented may be used with a reasonable degree of confidence in relation to the type and degree of flood control and water conservation measures that may be proposed for these areas.

Hydrographs for the maximum spring and summer flow periods are shown in Figures 6 and 7.

7. Low Flows

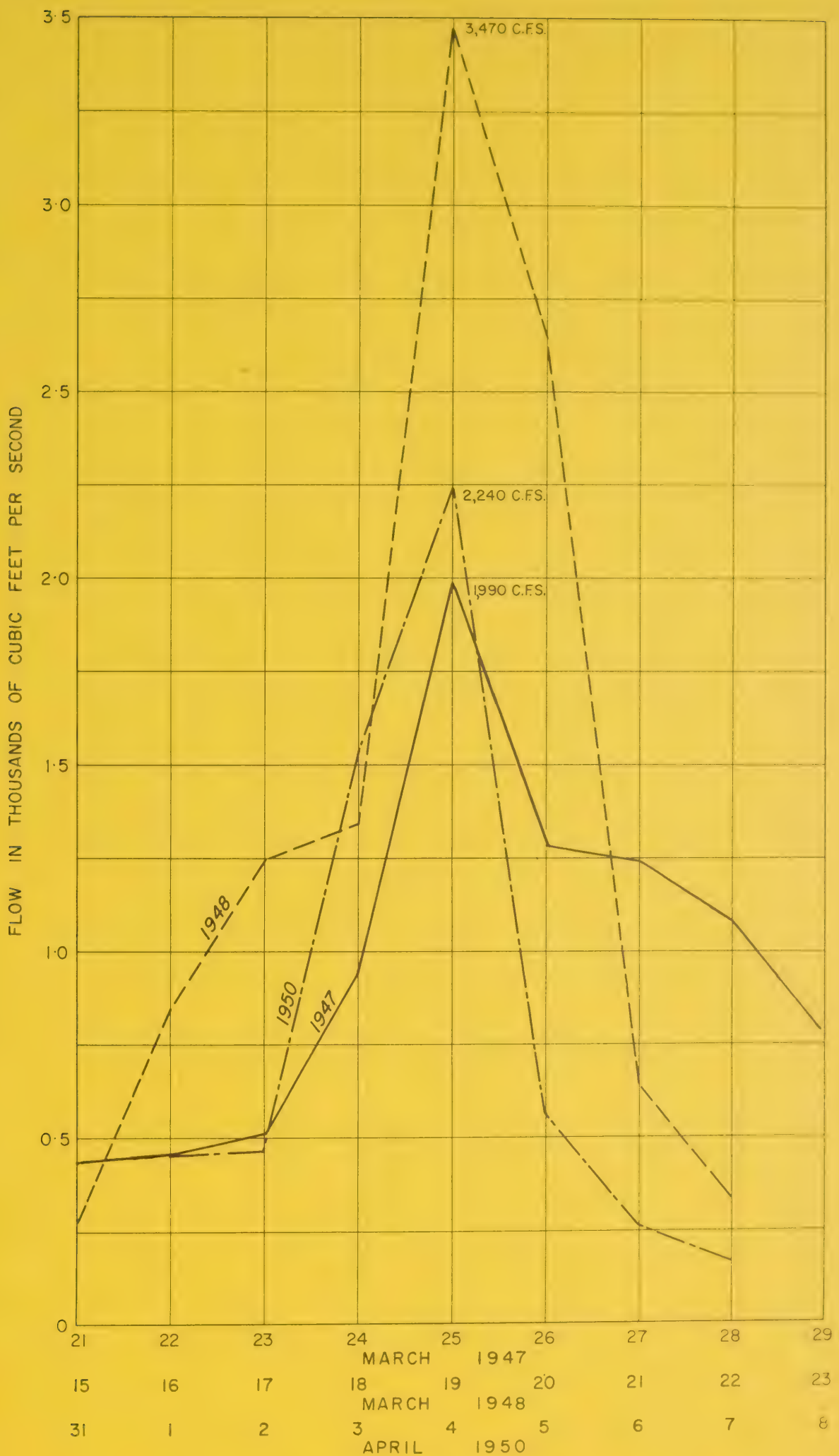
Table 4 shows periods of low flow normally occurring in August and September. Zero flows were recorded in both these months for the year 1952-53.

However, over the 10-year period the average of the minimum mean daily flows was 23 and 26 c.f.s. for August and September, respectively.

During one 2-week period from August 19 to September 3, 1952-53, the flow ranged from zero to 10 c.f.s. with an average for this period of 4.8 c.f.s. This is equivalent to 0.386 inches depth on the area for the period.

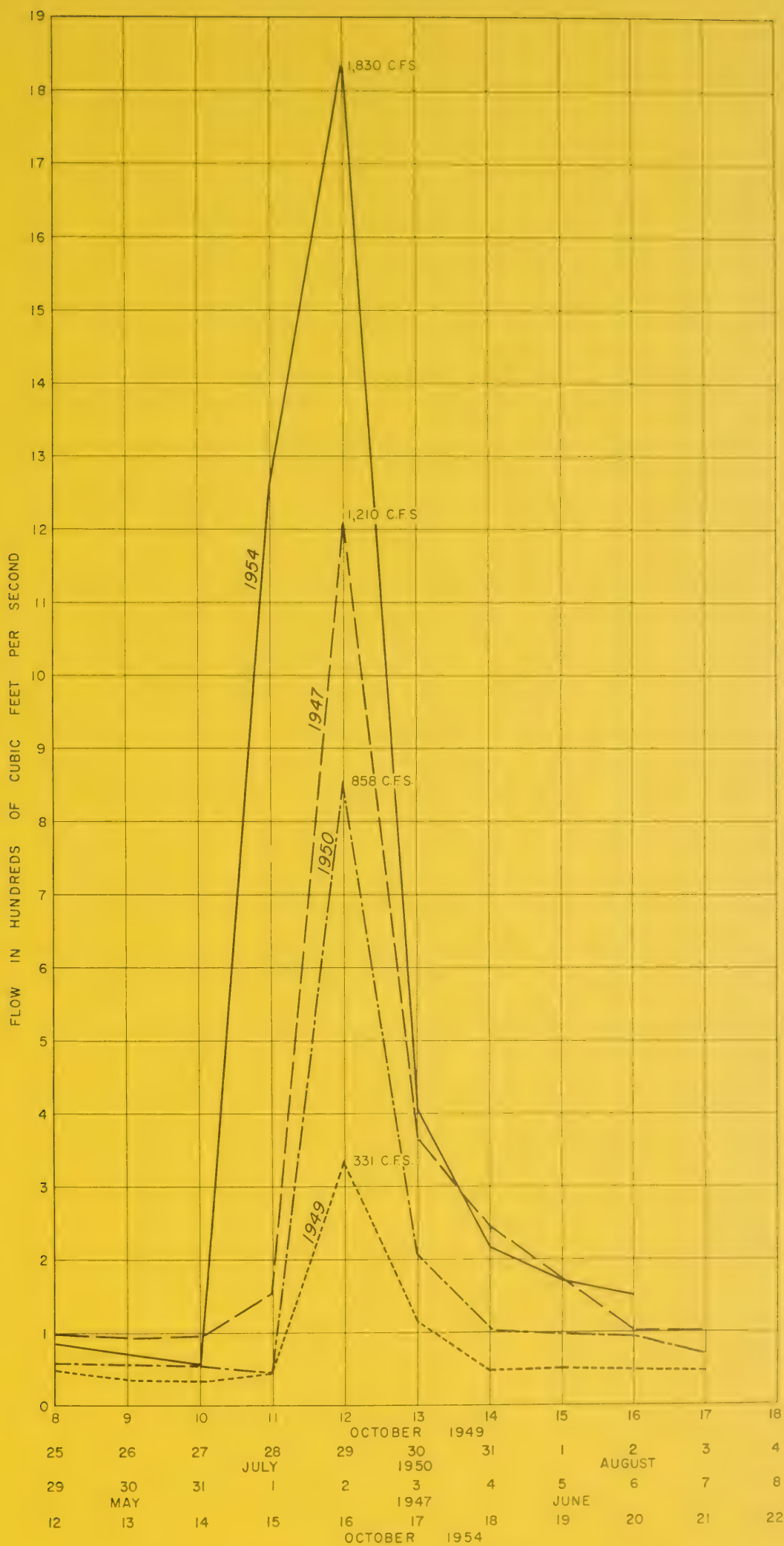
During this 15-day period the total rain recorded in the vicinity of the R.D.H.P. Watersheds was 0.22 inches at Uxbridge and 0.12 inches at Oak Ridges. There was no rain recorded at Agincourt or Green River for the period. At this time of year it is very likely that of this rain recorded at Uxbridge and Oak Ridges, practically all of it would be lost through infiltration and evapo-transpiration. Certainly very little ever reached the river channel via surface run-off.

Therefore, it appears that all the flow recorded for the period in question was withdrawn from ground water sources. Evidently this was a very dry period throughout the



SPRING FLOW HYDROGRAPHS DUFFIN CREEK AT PICKERING DRAINAGE AREA 112 SQ. MI.

Mean daily flows plotted from records of the Water Resources Division
 Dept. of Northern Affairs and National Resources Ottawa.



SUMMER FLOW HYDROGRAPHS
DUFFIN CREEK AT PICKERING
 DRAINAGE AREA 112 SQ. MI.

Mean daily flows plotted from records of the Water Resources Division
 Dept. of Northern Affairs and National Resources Ottawa

entire R.D.H.P. area. However, such a dry period could happen again and possibly at a more critical period in relation to crop growth.

Also, such a dry period would be detrimental to water supply, for both domestic and industrial use. The R.D.H.P. Watersheds border on the rapidly expanding Metropolitan Toronto area and a substantial increase in the watersheds in population and industry is certain and, with no over-optimism, it is quite possible that large areas of the watersheds will be urbanized and that there will be a demand for stored water for domestic and industrial use. Water from storage reservoirs could also be used to supplement low flows and provide adequate water for recreation and fish life. If so, reservoir sites on Duffin Creek, if economically justified, and developed, would satisfy demands for water on the Duffin Creek Watershed.

8. Pollution

Although there is no serious pollution problem now, there will be with the expected increase in population and industry unless timely preventive measures are taken. The treatment of domestic and industrial effluent should be such that it is harmless before entering a stream. Measures to increase low flows should not be relied upon entirely to dilute these effluents but they could reduce the cost of prior treatment conceivably to the point where such treatment could be carried out economically.

There is evidence of pollution during the "low flow" summer period, at most places where the streams are nearly dry. Places subject to pollution are chiefly on the smaller streams tributary to the main channels of the Rouge, Highland Creek, Duffin Creek and Petticoat Creek or on the adjacent streams in the vicinity which drain to Frenchman Bay directly.

CHAPTER 7

COMMUNITY PONDS

Community ponds are public ponds and usually larger than the private farm ponds. The community ponds provide recreational centres for bathing, fishing and boating during the summer and skating and hockey during the winter months. When conveniently located and with adequate open space available for recreational facilities, old mill sites which have some historical interest are preferred. Old mill sites, however, are not always available or adaptable and other sites must be found.

A reconnaissance survey of community pond sites has been made on the R.D.H.P. Watersheds. Thirty-eight sites were examined 18 of which were selected as possibilities from which a choice may be made. These sites do not include all possible sites and there may be others more acceptable to the Authority which were not investigated.

The preservation and construction of permanent dams has been limited to the upper reaches of the streams owing to the larger and more expensive spillways required at sites located farther downstream. However, small removable dams or by-pass ponds may be constructed at reasonable cost in the lower sections of the river.

The sites are divided into 3 types, the prefix letter denoting the type:

- (N) Natural lake or pond
- (E) Existing dam and/or pond
- (P) Possible sites.

Their locations and types are shown on Fig. 8 and a brief description of each follows:

Natural Lakes or Ponds

Fourteen natural lakes or ponds are located at or near the headwaters of the Rouge River and its tributaries, among the larger being -



COMMUNITY PONDS

LEGEND

- NATURAL LAKES OR PONDS (N) ▲
- EXISTING DAMS AND PONDS (E) ■
- POSSIBLE DAMS AND PONDS (P) □

SCALE 1/2 0 1 2 3 4 MILES

FIG. 8

Phillips Lake	16 acres
Bond Lake	40 "
Haynes Lake	6 "
Simeon Lake	8 "
Reesor Lake	40 "

At the headwaters of Duffin Creek near Goodwood there are six small ponds.

Existing Dams and Ponds

1. (E) Bruce Creek, Lot 1, Con. IV, Whitchurch

A privately-owned scenic pond of approximately 5 acres immediately north of the Whitchurch-Markham town line.

2. (E) Little Rouge, Lot 35, Con. VI, Markham

A three-acre pond formed by a dam 5 feet in height still supplies limited power to a sawmill operating on the site.

3. (E) Tributary of Little Rouge, Lot 1, Con. VII, Whitchurch

A privately-owned small scenic pond of less than 1 acre located immediately north of the Whitchurch-Markham town line.

12. (E) Unionville, Bruce Creek, Lots 13-14, Con. V, Markham

A good example of a private recreational pond may be seen here. The pond is used for swimming by the Unionville Swimming Club during the summer months. During winter months the pond is lowered to provide skating.

The maximum area flooded by the dam, 20 feet in height, is approximately 15 acres.

25. (E) Glasgow, West Branch Duffin Creek, Lot 6, Con. II, Uxbridge

A 10-acre pond is formed by a dam 7 feet high. The upstream portion of the pond area is heavily wooded.

26. (E) Altona, West Branch Duffin Creek, Lot 30, Con. IX, Pickering

A 15-acre pond and the surrounding land have been privately developed as a bird sanctuary.

31. (E) Whitevale, West Branch Duffin Creek, Lot 32, Con. V, Pickering

The flour mill in Whitevale is presently using power from a 15-acre pond located about 2,000 feet upstream.

The area surrounding the pond is heavily wooded.

49. (E) Duffin Creek, Lot 10, Con. III, Uxbridge

A dam 20 feet in height forms a 15-acre pond at the head of the west branch of Duffin Creek, $1\frac{1}{2}$ miles south-east of Goodwood. A small sawmill uses power from this site.

50. (E) Glen Major, Duffin Creek, Lot 2, Con. IX, Uxbridge

The Glen Major Fishing Club maintains two dams at the head of the main branch of Duffin Creek.

The surrounding area is quite hilly.

Recreational facilities in the area could include fishing, hiking and skiing.

54. (E) Woodland Park, Little Rouge, Lot 6, Con. V, Scarborough

A small removable dam provides a pond having a depth of about 4 feet for swimming in the park area. This area has been privately developed as a summer playground.

56. (E) Balsam, Tributary Duffin Creek, Lot 7, Con. IX, Pickering

A pond of approximately 6 acres is located about 2,500 feet north of the concession road. The surrounding area would provide good recreational facilities. Access to the site is difficult.

Possible Sites for Dams

4. (P) Bruce Mills, Bruce Creek, Lot 34, Con. V, Markham

The spillway of the mill dam built in 1828 failed in 1950 and was totally destroyed in October 1954. The pond area of 14 acres is heavily silted.

The cost of rehabilitating this dam to its former height of 17 feet is estimated at \$35,000.00. This is quite the most costly of any of the sites listed but the old mill, at the dam, is still in good workable condition and the surrounding area should provide good park and recreational facilities.

8. (P) Headford, Rouge River, Lot 19, Con. III, Markham

The construction of a spillway between the earth wings of the old dam would provide an 8-acre pond at this site.

The west bank is steep and wooded while the east bank slopes gently but is lacking in shade trees.

11. (P) Buttonville, Rouge River, Lot 14, Con. III, Markham

The earth wings of a mill dam constructed before 1848 may be seen immediately upstream of the Rouge River Bridge at Buttonville. The timber spillway failed in 1920 and the dam was abandoned.

A pond having a depth of 12 feet and an area of 14 acres could be obtained by rebuilding the spillway between the earth works.

The pond is adjacent to the Buttonville aerodrome. Limited park and recreational benefits could be obtained at this site.

15. (P) Milne Site, Rouge River, Lot 9, Con. VII, Markham

The remains of the Milne Dam may be seen on the Rouge River near the southerly limits of the town of Markham and west of Highway No. 48.

The existing structure is in fair condition and could be restored at reasonable cost to provide a pond of approximately 40 acres. It has been estimated that it would cost \$12,100 to restore the dam to its reduced height. To restore it to its original height would not cost much more and the benefits of the larger pond area would more than offset the increase in cost.

A large portion of the pond would be within the town limits and should provide excellent park and recreational facilities for the area.

35. (P) Claremont, Duffin Creek, Lot 19, Con. VIII, Pickering

The remains of an old dam are visible just west of the Claremont-Brougham road. A 7-acre pond could be formed by a dam 15 feet high and 400 feet long. Much of the remaining embankment could be used.

This is the site of the "Claremont Reservoir" listed in the surveyed reservoir sites.

A much better site in this area is located approximately 1,300 feet downstream. (See below)

36. (P) Claremont, Duffin Creek, Lot 18, Con. VIII, Pickering

A good site exists approximately 1,300 feet downstream from site No. 35. The earth embankments of an old dam appear to be in good shape and the addition of a spillway in the present gap would provide a 6 to 8 acre pond.

24. (P) Cedar Grove, Little Rouge, Lot 1, Con. IX, Markham

The rehabilitation of the mill dam would not be feasible as a community pond but the general reach of the river in this area is adaptable to small removable dams in many locations.



Temporary dam at Woodland Park, Rouge River. In the lower sections of the rivers where permanent dams would be a costly undertaking small removable timber dams such as this may be constructed at reasonable cost to provide a pool for recreation purposes.

CHAPTER 8

SUMMARY

The general physical features of each of the watersheds have been described in this report. The history and causes of flooding, the communities affected and the 1956 assessed value of the flooded properties have been recorded.

All possible reservoir sites on the watersheds have been examined and where considered feasible the sites have been surveyed and contour plans prepared. These are on file and are available if and when required. In examining the watersheds for flood control the aim has been to provide sufficient storage and/or other improvements that would control floods 1-1/3 times the magnitude of the greatest flood on record.

There is sufficient storage available in the Duffin Creek sites, but the cost of dams and reservoirs for flood relief alone would be prohibitive and is not justified at the present time. However, owing to the great expansion of Metropolitan Toronto and suburban areas it is quite possible that the demand for domestic and/or industrial water supply and for the dilution of sewage wastes would justify the expense of dams at some future time. In this event the reservoirs could be developed as multi-purpose units to help regulate flood flows as well.

With the exception of the Goodwood Community the only measures for flood relief in those areas affected are channel improvements, but even this expedient is expensive and, in view of the light damage, cannot be justified at this time. For Goodwood a pumping system appears to be the most economical solution.

Whereas in the past works for flood relief have been based on the greatest spring flood on record, from the experience of storm Hazel, it is now evident that such work must be based on hurricane type storms which normally occur in

September or October. The severe 6-hour thunderstorm is also a critical factor, particularly in the smaller areas of a hundred square miles or less.

The flows on Duffin Creek at the Pickering gauge for the flood of October 15 and 16, 1954 which resulted from Hurricane Hazel are given. At its centre over the Etobicoke and Humber watersheds this was the greatest storm on record, but storms of this and even greater magnitude could occur over any watershed in Southern Ontario.

The approximate rate of run-off for flood Hazel as it actually occurred over the R.D.H.P. watersheds is given. The estimated rates of run-off for storm Hazel centred over the area are also given and what they could be for a probable maximum storm are indicated.

The low summer flow conditions which, to the present time, have not caused any serious pollution problem, have been indicated and it has been emphasized that unless timely preventive measures are taken pollution may become serious with the expected increase in population in the area.

A large number of existing and former pond sites and a number of possible sites on the watersheds were investigated to determine the most suitable sites for the development of community ponds in the area. The most suitable sites are listed and described in Chapter 7, as a guide to the Authority in laying out a Community Ponds program.

ABBREVIATIONS, EQUIVALENTS AND DEFINITIONS

Abbreviations

ac. ft.	is the abbreviation for <u>acre foot</u> which is equivalent to 43,560 cubic feet and is the quantity of water required to cover one acre to a depth of one foot.
c.s.m.	is the abbreviation for <u>cubic feet per second per square mile</u> and is the average number of cubic feet of water flowing per second from each square mile of drainage area.
c.f.s.	is the abbreviation for <u>cubic feet per second</u> and is the unit generally used to express discharge or the rate of flow.
M.P.N. or m.p.n.	most probable number
ML or ml.	millilitre
P.P.B. or p.p.b.	parts per billion
P.P.M. or p.p.m.	parts per million
PH or ph	value measure of acidity or alkalinity

Equivalents

1 c.f.s.	= 6.25 imperial gallons per second
1 c.f.s. for 1 day	= 1.98347 acre feet or approximately 2 acre feet
1 c.f.s. for 1 year	= 724 acre feet
1 ac. ft.	= 271,472 imperial gallons
1,000,000 imperial gallons per day	= 1.86 c.f.s.

Definitions

BOOST STORAGE is the storage required to increase the head of water over the discharge tubes in order that they may be able to discharge the required flow.

CHANNEL CAPACITY or "IN-BANK" FLOW is the maximum flow which is contained within the river banks and does not overflow the adjacent low lands.

CHANNEL CAPACITY STORAGE is the volume of water that must be impounded in order that the stream flow will not exceed the channel capacity flow or stage.

CONSERVATION STORAGE is that volume of water remaining in a reservoir which may be used to augment the low flows and is equivalent to the maximum storage capacity of the reservoir less the dead storage, evaporation and ice losses and the space reserved for flash floods.

DAM is a structure in and across a river valley to impound, control and otherwise regulate the river flow.

DEAD STORAGE is the amount of water kept in a reservoir at all times for the purpose of protecting the artificial and natural water seals at the base of the dam.

DISCHARGE TUBE or CONDUIT is an opening through the base of the spillway to provide means for discharging water when the water level of the reservoir is below the spillway level.

FLOOD is an overflow or inundation coming from a river or other body of water.

FLOOD CONTROL is the prevention of flooding by controlling the high water stages by means of storage reservoirs, dikes, diversions or channel improvement such as widening, deepening and straightening.

FLOOD CONTROL STORAGE is the total volume of water that must be impounded during a given flood in order that the stream flow will not exceed the channel capacity flow or stage and is equal to the sum of the channel capacity, dead, boost and operational storages.

FLOOD CREST is the maximum height or stage that the flood waters reach during any one flood period.

FLOOD HYDROGRAPH - a hydrograph which covers only the flood period or time interval during which the river flow is above the flood stage.

FLOOD RATIO is the rate of peak flow to the average flow for the flood period.

FLOOD STAGE is an arbitrary flow stage which varies from place to place and from season to season and is that flow or water level at which the water threatens to do damage.

FREEBOARD is the vertical distance between the maximum permissible water level and the top of the dam or dikes.

HYDRAULICS as applied to conservation deals with the measurement and control of run-off from river drainage basins.

HYDROGRAPH is a plot of flow against time and is a correct expression of the detailed run-off of a stream resulting from all the varying physical conditions which have occurred on the drainage area above the gauging station previous to the time which it represents.

HYDROLOGY is the science which deals with the occurrence and distribution of water in its various forms over and within the earth's surface. As applied to conservation it deals more specifically with that portion of the hydrologic cycle from precipitation to re-evaporation or return of the water to the seas and embodies the meteorological phenomena which influence the behaviour of the waters during this phase of the cycle.

OPERATIONAL STORAGE is additional storage that is required to provide a safety factor to enable the controller to regulate the discharge from a dam so as not to exceed the channel capacity flow or stage.

RATE OF RUN-OFF is the rate at which water drains from an area. Usually expressed in cubic feet per second (c.f.s.).

RATE OF RUN-OFF PER SQUARE MILE is the average number of cubic feet per second of water flowing from each square mile of area drained (c.f.s./sq. mi. or c.s.m.).

RESERVOIR is the body of water created by the construction of a dam.

RESERVOIR CAPACITY is the maximum amount of water that may be contained within the reservoir without exceeding the maximum permissible water level. Usually expressed in acre feet.

RUN-OFF is the amount of water which reaches the open stream channels and may be broadly defined as the excess of precipitation over evaporation, transpiration and deep-seepage.

RUN-OFF DEPTH IN INCHES is the depth to which the area would be covered if all the water flowing from it were conserved and uniformly distributed over the surface.

SPILLWAY is that part of a dam over or through which the water is discharged.

SPILLWAY CAPACITY is the maximum amount of water that may be discharged over the spillway without exceeding the maximum permissible water level in the reservoir.

STREAM GAUGE is a measuring device used to determine the elevation of the water surface at selected points - usually a graduated rod fixed in an upright position and set to a known elevation from which the gauge readings are obtained by direct observation. Automatic type gauge is a mechanically operated recording instrument which gives a continuous record of water surface elevations.

WATER or CLIMATIC YEAR is a 12-month period from October 1 to September 30. The water year was found to be a more convenient form than the calendar year for the purpose of stream flow studies as it groups together those months in which the water losses due to evaporation and vegetation demands are at a minimum (October - March) and those during which the losses are high (April - September).

WILDLIFE

CHAPTER 1

INTRODUCTION

No detailed examination of the environment for wildlife in the R.D.H.P. Watersheds was made during this survey. Sound deductions for improvements to upland game, waterfowl and fur-bearers (as well as to other species of interesting appearance, rarity or habits) cannot be made on the basis of a few weeks' observations over a wide area. These require a study of the existing habitat for each species and of the dynamics or changes of populations for a period of several seasons. Such studies are already being made by the Divisions of Research and Fish & Wildlife of the Department of Lands and Forests.

One small part of the watershed was given special attention for two reasons:

- (1) because it contains sections which are particularly suitable for recreation, remarkably close to the great population of Metropolitan Toronto;
- (2) because in certain sectors the vegetation closely resembles that of pioneer times and there appears to be a greater variety of wildlife habitats than in other parts of the watershed.

The area selected was the lower Rouge River valley and its environs. This part of the watershed can be recommended either as a natural park or as an area where different types of land use could be demonstrated, varying from those of pioneer times to the most efficient now known. This subject is discussed in greater detail in the Recreation section of this report.

The chief detailed work during the survey consisted of a study of the streams as suitable environment for fish. Duffin Creek has been studied in some detail in the past, but in this survey equal emphasis was given to all the water-courses.

CHAPTER 2

WILDLIFE CONDITIONS ALONG THE LOWER ROUGE RIVER

1. Introduction

Most of the course of the lower Rouge River lies in the north-eastern part of Scarborough Township which constitutes the eastern section of Metropolitan Toronto with its great population (approximately 1,300,000). The river consists of two branches which unite close to Lake Ontario. Each flows into a rapidly deepening valley such that the steep banks are over 125 feet high at the junction. This fact alone has probably preserved much of the existing forest in the highlands which separate the two branches. Most of the valleys are wooded. These woods provide natural game trails. Most of the surrounding area is still farmed. Orchards are common in the lower region and there are several large gravel pits near the valleys.

Since the river valleys and several of the adjacent woodlots are very attractive, and relatively wild in appearance, the existing forested areas were examined to obtain some idea of their wildlife and recreation possibilities.

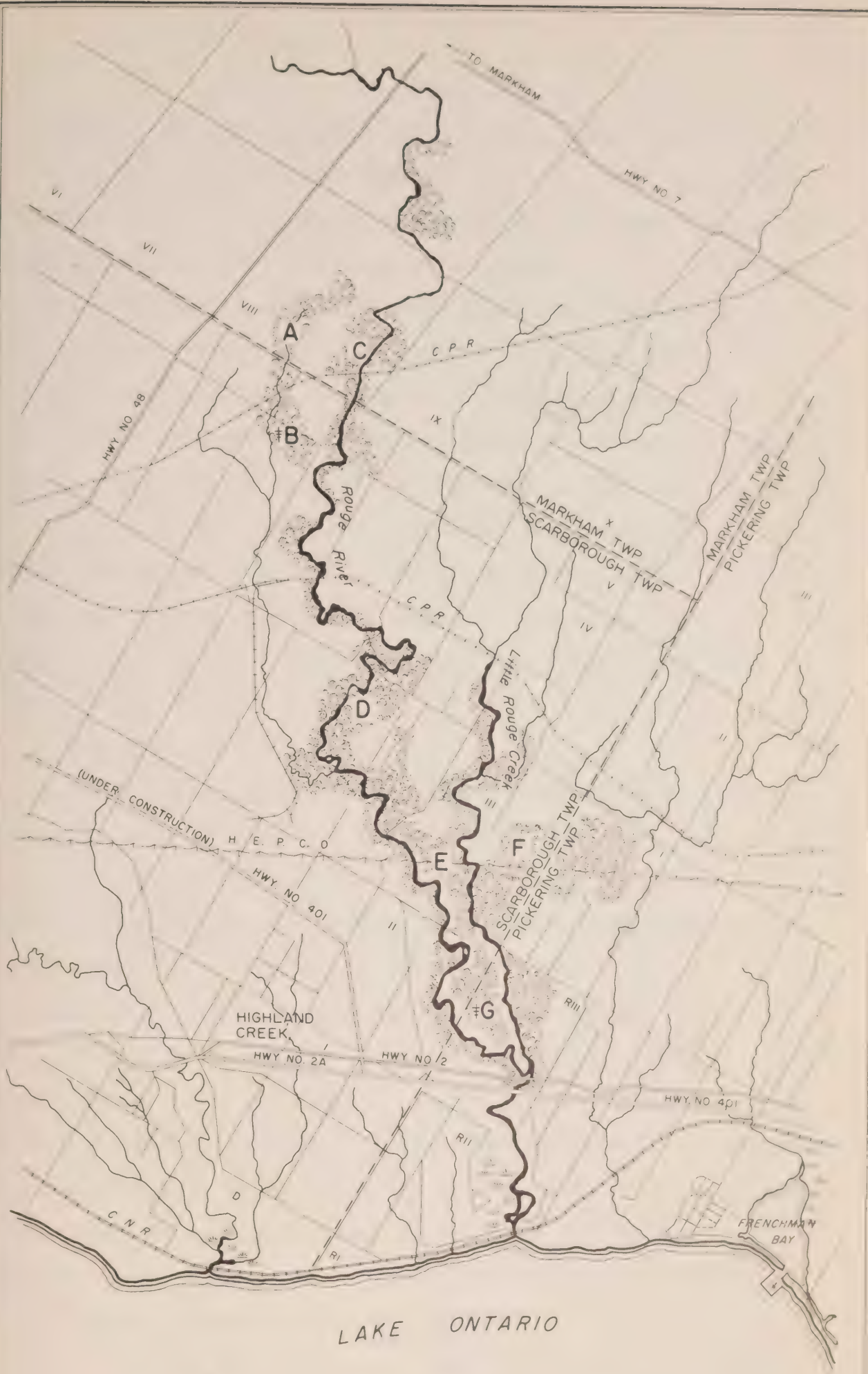
2. Method

Seven areas were selected from the aerial photographs of the R.D.H.P. Watersheds, and closely examined in May 1954. The major ground cover and the surrounding land use were mapped. General observations were made on wildlife habitats and records were made of all animals observed during eight days in the area. Several local farmers were interviewed to obtain their impressions of the wildlife conditions in the area. In every area the ground vegetation and the amount and condition of the tree cover greatly affect the possibilities of the land for wildlife.

The accompanying map indicates the areas selected for special study. These are lettered A to G.

Area A

Area A lies along a tributary stream in Markham



LAKE ONTARIO

LOWER ROUGE RIVER

SHOWING

AREAS REFERRED TO IN THE R.D.H.P. WILDLIFE REPORT

LEGEND



WOODLAND

A, B etc.

AREAS STUDIED



AREAS OF SPECIAL INTEREST

SCALE 1 1/2 0 1 2 MILES

Range numbers conform to Township Surveys and not to 1951 Army Survey maps

Township. The stream divides into two, so that a low moist area of cedar surrounds a small central hill covered with a mature ungrazed maple - beech forest. Trilliums were numerous on this high ground while ferns and marsh marigolds were the prominent ground cover in the low moist westerly projection of the woodlot. The northern section of the woodlot is in a long narrow valley and is rather open and grazed. West of this valley is an area of scrub in which the chief cover is hawthorn, raspberry, golden-rods and grass. The rest of the surrounding area is cultivated.

The land is good habitat for pheasants, rabbits, raccoons and grey squirrels, all of which were common. Ground-hogs appeared numerous in the northern section and evidence of muskrats was found. A very wide variety of birds was found in the various types of cover.

Area B

Area B, south of Area A in Scarborough Township, consisted basically of two forest types. The south-west portion is mostly under cedar cover, much of which is quite open but becoming denser near the stream. The rest of the area is a maple - beech forest of which about one half is grazed. The undergrowth is fairly sparse, although one section which has not been grazed for about two years has a thick growth of young maples about 2 feet in height. Nearly all of the surrounding area is either cultivated or in pasture and several old neglected hay fields are in close proximity to the woodlot. Several snake fences provide excellent cover for wildlife, particularly for pheasants, which appeared to be common. Cottontails, grey squirrels and raccoons were also common.

A low marshy area immediately west of the cedar thickets should be suitable woodcock habitat.

This area provides a fair habitat for wildlife. The open cedar woods are park-like and have been used as picnic grounds for many years. The stream is spring-fed, clear and cool, but with a fairly small flow.

Area C

Area C is a much larger area along the Rouge River in Markham Township. South of the railroad tracks the valley is open grassland with cedar predominating on the banks. North of the railroad tracks on the west side of the river there is a dense cedar thicket which extends for a considerable distance up the river in the lower part of the valley. It is surrounded on the banks and high land by hardwoods, mostly mature maple. The east side of the river is mostly a mixed woods with maple, beech, hemlock and cedar. To the north of the area small young woodlots, mostly maple, extend westward almost to Area A. Along both sides of the river there is a large grazed hawthorn-studded pasture which adjoins cultivated fields.

Wildlife cover is fairly good throughout this area, and stump and rail fences provide excellent game trails. Much of the ground cover has, however, been destroyed by cattle.

Pheasants, rabbits, raccoons and grey squirrels appeared to be common.

The section south of the tracks has already been used as a picnic site.

Area D

Area D is a large area on the western branch of the main Rouge River located wholly within Scarborough Township. The valley is deep with rather steep banks. The west bank is steep and covered with mature sugar maple, beech, birch and white pine. The southern portion of the valley in this area is mostly a flood plain with a dense growth of young aspen, willow, birch and cedar. The cover in the eastern section is composed predominantly of hardwoods. Willow, aspen and birch are found along the river edge while to the south cedar is more common.

There are two small orchards in the valley on the east side of the river and the entire eastern section on top of the valley is covered with apple orchards. Apple orchards are also common west of the valley. All are kept quite clean

and the brush is apparently burned, although much brush has been dumped into the river down various high eroded banks.

Where there are no orchards surrounding the valley there are gravel pits. The entire south-eastern section has been heavily exploited for its gravel and even in the valley on the east side of the river much gravel has been removed.

Area D appears rather unsatisfactory for wildlife because of the many eroded steep banks, the clean orchards and the gravel pits, all of which provide little cover or food for wildlife.

Grey squirrels, foxes and rabbits appear to be fairly common, but pheasants are scarce.

There are several old roads penetrating into the gravel pits in the valley.

Area E

Area E lies between the two branches of the river. The land is primarily a high narrow ridge separating the two branches. A wide swath has been cut through the area for the passage of four hydro lines. North of this swath cultivated fields extend almost to the edge of the valley. There are several private homes along the river to the west of this area.

The lowland cover is mostly white cedar with maple-beech stands on the high banks. The eastern valley is pastured but the banks have a fairly thick growth of mixed woods. The hydro cut is also pastured and is quite open, and likely to remain so. In the western valley there are few flat lowlands since most of the river banks rise abruptly to considerable heights. The central ridge is quite flat on top and a path extends over half a mile along it.

Conditions for wildlife are good since the area offers a wide variety of diverse habitats. Pheasants were heard in the highlands and two ruffed grouse were flushed from the cedar thickets below the ridge. Two woodcock were flushed from swampy ground near the river. Cottontails, black squirrels and foxes were common.

Area F

Area F lies partly in Scarborough Township and partly in Pickering Township (east of the river). North of the power lines the land facing the valley is an extensive gravel pit containing, in the older section, much willow, aspen and sumach. To the east there is a large woodlot, with thick undergrowth of mountain maple, elm and cedar. The steep banks of the valley are also covered with hardwoods. The bottom of the valley is cultivated and pastured.

Grouse were found in this area, as were cotton-tail rabbits, and signs of raccoons and foxes were observed. The underbrush is thick and the scattered cover is good. This area might be attractive to woodcock or deer.

Area G

Area G lies between No. 2 Highway and the First Concession Road to the north. The eastern half lies in Pickering Township and the western half in Scarborough Township. The two branches of the river approach closely and then run far apart before uniting. The large central area is high, with steep well wooded banks. The flat valleys are mostly flood plains containing considerable sand and silt. The side banks are also steep and densely wooded. Cedar predominates on the south-western bank which tends to become more open in the northern section where the cedar appears in clusters scattered about the flattening valley.

The central region is very diverse and the ridge is also much dissected to the north, with a few small gullies cut into it. The woodlands are very fine and unspoiled, including pure hardwoods and mixed woods.

There is no evidence of previous logging in the southern section, but there is evidence of a fire about twenty years ago.

Considerable attention was given to examination of the major species of shrub and undergrowth cover in this area and these were mapped. Along the south-western slopes, with a

crown cover of about 70 per cent, shrubs and secondary growth are sparse, but scattered hazel, beech, dogwood and maple-leaved viburnum were found. The ground cover is not thick, but grasses, ferns, goldenrod and ginseng were common.

A high ridge slopes gradually westward down to the valley floor from the central section. The northern slopes have little undergrowth or ground cover under a hemlock stand. In the valley there are several small ponds, and twining grape vines add to the cover.

The flat central region has a crown cover of about 90 per cent, with inevitably little undergrowth, and a ground cover of scattered ginseng, star flower and the common members of the Lily family. Deadfalls were quite common in these woods.

North of the fence which crosses the central woodlands, the land is well dissected with gullies and ridges. Among the second-growth stands here, sumach, bracken, poison ivy and grasses comprise the major ground cover and shrubs. The north-eastern bank of the east valley contains many hawthorns amongst the maple, oak, beech and pine trees. There is also a witch-hazel thicket and an old wagon trail.

Parts of the two valleys have been used as pasture or hayfields. In the whole area the forest edges naturally contain the greatest diversity of trees and shrubs and for many species the best wildlife habitats. One small area which was examined contained 39 species of trees and shrubs and the ground vegetation was of course more varied still.

3. Wildlife Status

The following summarizes the status of the larger and better known species of wildlife in the Lower Rouge area.

(a) Common pheasant: Phasianus colchicus

The common pheasant is by far the most important game bird to be found in the Lower Rouge River area. It was

either seen or heard throughout most of the area, especially in the farming districts.

Number encountered in the area: 23 (15 males and 8 females).

On two occasions in early May four females were observed with one male.

Many residents seemed to think that pheasants have increased in the past few years because hunting is no longer allowed in Scarborough Township. However, the past mild winters are probably the major factor in any noticeable increase in numbers.

(b) Ruffed grouse: Bonasa umbellus

Number observed in the area: 6.

Grouse were encountered only in the wooded slopes in the southern portion of the area. White pine drumming logs, which indicated recent use, were found on one slope.

Grouse are not common nor is it likely that they ever will become abundant. All the birds were found only in the more remote woodlands.

(c) American woodcock: Philohela minor

Number observed: 2.

The woodcock will undoubtedly remain few in number, since the type of habitat in which they are normally found is not common.

(d) Raccoon: Procyon lotor

Number observed: 1.

This species is almost certainly common. Tracks were observed along nearly every portion of the river and were especially common in mature hardwood woodlots. Many hollow trees were found. Some showed signs of being inhabited by raccoons. Although hunting is not legal in Scarborough Township three dead raccoons were encountered which were probably killed by man. They appear to be fairly abundant and the mature hardwoods by the streams provide excellent territory for them.

(e) Red fox: Vulpes fulva

Number observed: 7.

Reported to be common.

Four of the foxes observed were cubs. Fox droppings were observed on several occasions.

Foxes appear to be fairly abundant and local farmers report occasional destruction of their domestic fowl. Several foxes have been reported to have been shot by farmers.

(f) Cottontail rabbit: Sylvilagus floridanus

Number observed: 15.

Reported to be common.

Cottontails were observed in thickets near the forest edges or in small woodlot areas. The cottontail appeared to be common throughout most of the lower Rouge area.

(g) European hare: Lepus europaeus

Number observed: 2.

Reported to be common.

The hare is principally an animal of the open farming country. None was encountered when the woodlots were examined. Probably they are common in their appropriate habitat but their numbers would not be as great as that of the rabbits.

(h) Woodchuck: Marmota monax

Number observed: 25.

Reported to be common.

The ground hog is a rather ubiquitous animal in that it is found throughout the area in open fields, valleys, woodlots and forest, although it is most commonly found in the open fields or valleys.

It is quite common except in the sand and silt plains and the denser woodlands of the river valleys.

(i) Grey squirrel: Sciurus carolinensis

Quite common.

Either the black or grey phase of this squirrel was encountered in every hardwood stand visited. They were also common in mixed woods, especially where oak and beech were found.

During four days, 10 grey and 10 black squirrels were counted. The habitat appeared good for this squirrel.

(j) Red squirrel: Tamiasciurus hudsonicus

Common.

Cedar and hemlock or mixed woods appeared to be the most common habitat for this squirrel.

(k) Muskrat: Ondatra zibethica

Common.

None was observed, but droppings on stones by the streams were fairly numerous, which indicated that a reasonable number must inhabit the area.

A few farmers trap muskrats in the area.

(l) Skunk: Mephites mephites

Occasional to common.

None was observed, but as they are very generally distributed in Southern Ontario they are no doubt present in this area also.

(m) Mink and weasels: Mustela vison and Mustela sps.

Occasional.

None was observed but they were reported by a trapper to be present in the region.

(n) Whitetail deer: Odocoileus virginianus

Rare.

No signs of deer were observed except a single set of antlers found in a cedar thicket. Local residents have reported seeing deer in the area in past years. Three farmers reported that they used to see deer fairly frequently up to 1952 but that they have since become scarce. There was one report of a doe with two fawns seen north of the area under examination this spring.

Obviously, deer have not been common, and only rarely one may find its way south along the watercourses and adjacent fields. There are only a few areas in which deer could winter adequately with sufficient food, and dogs are numerous in the valley.

(o) Waterfowl (Migrants)

Three separate pairs of mallards were observed on small ponds in the area during the spring, but later left the area. One large pond had 22 marsh ducks, several of which were mallards and the rest were not identified with certainty. They, too, did not remain in the area.

4. Conclusions

No two areas are exactly alike with respect to vegetation, and it is not to be expected that any one small area could provide an abundance of the various wildlife species as well as provide a general recreational area. However, the one area examined north of No. 2 Highway (Area G) does have more to offer than any of the other areas and is also an excellent park site.

The best small area on a tributary stream was that found in the north-eastern portion of Scarborough Township (Area B on the accompanying map).

Since the lower Rouge area is well supplied with water, woodlots and farm country, and hunting is prohibited in Scarborough Township, the wildlife in the area could be expected to be as good as, if not better than, in any other area in the vicinity. Most animals under consideration appeared common and habitats appeared favourable for them. With detailed surveys and good management, this condition could be maintained and improved.

Any plans for a large park or recreation area should be made with proper consideration for the varied requirements of the wildlife wanted there. Since most of the area of interest for its wildlife lies in townships in which no shooting is allowed (although trapping may be permitted), the chief value of the wildlife will be in its variety.

In addition to the species already listed, there are found on the R.D.H.P. Watersheds, as a whole, at least 20 other species of mammals (chiefly mice, bats and shrews), and at

least 200 species of birds (including about 100 species resident in summer or permanent residents, and about 100 migran species, together with a few winter visitors). In the great variety of vegetation cover types in the lower Rouge area there are exceptional opportunities for nature study. The two areas listed as B and G in this chapter and shown on the accompanying map appear to be most interesting of those studied.

Any township which has an Official Plan under The Planning Act, and a Zoning By-law to implement the Plan, could zone some of these areas and protect them for the public now and for future generations. It is recommended that the Conservation Authority press this need. This matter is discussed more fully in the Recreation section of this report.

CHAPTER 3

IMPROVING THE LAND FOR WILDLIFE

There are many varied types of land in the R.D.H.P. Watershed. The requirements of food and cover vary greatly for different species of wildlife. The recommendations here listed are therefore those which can be most generally applied by the landowner.

1. Woodlands

The elimination of grazing of woodlots would be the most useful single measure in improving the wildlife environment. Reforestation plans are included in the Forestry report. In plantations, up to about the tenth year from planting, the entire planted area is valuable for wildlife. But large blocks of coniferous trees will, at least after the twelfth year from planting, have little or no undergrowth and will, apart from their edges, be comparatively sterile as far as upland game and most forms of wildlife are concerned. The chief improvements to be expected will therefore come from good management of the farm woodlot. Selective cutting is both sound forestry practice and good planning for wildlife. Landowners who have woodlots in which the crown canopy has closed over considerable areas, and who wish to produce a proper environment for wildlife, will find that release cutting slashings to stimulate sprout growth, thinnings and felling timber for sale will improve rather than retard the carrying capacity for wildlife. Construction of brush piles from cuttings is recommended where rabbits are desired, two or three such brush piles per acre being the normal spacing.

2. Cultivation Practices

All good farming practices which make a more luxuriant vegetation will improve the farm environment for wildlife. A few special practices will give more specific benefits. Strip-cropping, described elsewhere in this report, is of particular value since by this means no extensive area

is denuded of cover at one time by harvesting. In the less flat parts of the watershed, filter strips, either above water-diversion terraces or used as emergency waterways, provide travel lanes and nesting cover for wildlife. Cover crops such as the clovers provide a habitat and food for wildlife in areas that would otherwise be barren during the winter months.

The elimination of brushy fencerows is now becoming more common in the R.D.H.P. Watershed. Those who are interested in wildlife improvement will find that the inclusion of a few field boundary hedges on the farm will moderate the effect of winds on crops, serve as travel lanes and cover for wildlife, and harbour large numbers of songbirds which help to control insect pests. Inevitably the presence of boundary hedges on a farm tends to encourage the growth of weeds. This is the price that must be paid for improved wildlife conditions. Rosa multiflora is an excellent hedge-forming shrub. It has a tendency in Southern Ontario to die back in winter, but rapidly forms a dense hedge, which is reported to be proof against cattle and hogs. It provides both cover and food and does not exhaust the nearby cultivated ground. However, in view of its questionable hardiness, it should not be planted in the R.D.H.P. Watershed without consultation with the nearest biologist or forester of the Department of Lands and Forests, at Maple.

3. Cover Patches

Field corners are frequently barren of crops. Therefore a fence crossing which embraces the corners of four fields may be made into a haven for ground-nesting species by planting a few trees and shrubs and protecting them. It is important to rid such areas of useless weeds by crowding them out with useful species such as white sweet clover or the normal climax type of open vegetation, which is bluegrass.

4. Ponds and Streams

The importance of water to wildlife is often forgotten. Many farms have at least one low spot where a small amount of work with a scoop will provide a dam and a pond to provide nesting and feeding sites for water and marsh birds. If possible, ponds for wildlife should be separate from those intended for cattle or for fish. Willow cuttings pushed in the ground around such a hollow will rapidly provide wildlife cover. New water areas are usually very rapidly invaded by aquatic plants, but additional species may have to be introduced. No extensive duck food studies have been made in Southern Ontario. Wild rice may be introduced, but since it is not well adapted to wide variations in water levels, being often sterile in fluctuating waters, it cannot be considered as certain to succeed. The idea has long been current, and fostered by many sportsmen's organizations, that the planting of wild rice is the answer to the problem of how to attract ducks to any area. The fact is that wild rice is of little significance to ducks in Canada except in the fall, and does not provide good cover or nesting sites. The following species which may be easily obtained are recommended as certain to be valuable duck foods. If none of them occur in ponds or shallows with good cover for ducks they can be introduced.

Sago Pondweed	<u>Potamogeton pectinatus L.</u>
Red-Head Pondweed	<u>Potamogeton Richardsonii</u> (Ar. Benn.) Rydb.
Wild Millet	<u>Echinochloa crusgalli (L) Beauv.</u>
Japanese Millet	<u>Echinochloa frumentacea (Roxb) Link</u>
Wild Celery	<u>Vallisneria americana Michx.</u>
Knotweed	<u>Polygonum pennsylvanicum L.</u>
Water-Smartweed	<u>Polygonum coccineum Muhl.</u>
Three-square	<u>Scirpus americanus Pers.</u>
Great Bulrush	<u>Scirpus validus Vahl., var.</u> <u>creber Fern.</u>
Duckweed	<u>Spirodela sp. and Lemna sp.</u>

Those who are interested in farm ponds for wildlife will find very useful details of the various types of pond and methods for constructing each type in a booklet "Farm

Ponds" which is available from the Conservation Authorities.* Farm Ponds differ from those intended for wildlife in that care is usually taken to prevent the growth of aquatic vegetation in a farm pond intended only for watering stock or fire protection purposes. Otherwise the construction and details of ponds for wildlife should follow one of the types there described.

* Applications may be made to the nearest provincial Agricultural Representative, or to the Department of Agriculture, Parliament Buildings, Toronto.

CHAPTER 4

F I S H

1. Introduction

The intention of this survey was to classify the waters of the R.D.H.P. Watersheds as to their present suitability for fish and to make recommendations for possible improvements with examples in detail. However, two factors radically affect any deductions to be drawn from the survey. The first is the effects of Hurricane Hazel; the second is the fact that large numbers of salmon fry were introduced into one of the streams, Duffin Creek, between 1946 and 1948.

(a) Hurricane Hazel

The effects of the exceptional rainfall make most of the field data concerning the stream courses obtained in the 1954 survey inapplicable on, at least, the Rouge and Highland Creek and in part on Duffin Creek. A recent examination of these creeks has shown that many of the areas examined are greatly changed. Sections of the stream which were listed as silted or slow-flowing may now be riffles and rapids; other sections which were once rapids are now turned into pools. In addition many of the dams were by-passed or washed out. Bank erosion was very greatly accelerated. A number of dumps of rubbish and refuse were removed and their contents distributed through the valleys. It appears, however, that the chief characteristic which has not been altered except by removal of shading trees is the location of springs and the general characteristics of the water. Of the various streams examined, the Rouge and Duffin Creek have this in common, that they arise in the sandy interlobate moraine. Apart from the lowest four or five miles of these streams the gradients average 30 to 50 feet per mile. In a few sections erosion has exposed the soft bituminous shale, but for the most part stream bottoms are gravel, silt or clay.

Both Duffin Creek and the Rouge River have two main branches which converge on each stream about four miles from the lake. The location of the opening into the lake on Duffin Creek varies considerably from year to year, as affected by sand bars built up by the lake current.

(b) Salmon Fry Experiments

Duffin Creek was selected, after very careful examination of many streams entering Lake Ontario, as the site of an experiment to determine whether or not Atlantic salmon could be introduced into the tributary streams of Lake Ontario. It is well known that both the Rouge River and Duffin Creek were formerly famous for their salmon. A map published shortly after 1805* shows a salmon fishery at the mouth of the Rouge River. Farewell† noted in 1907: "The waters of Uxbridge streams are so clear and cold and pure that speckled trout abound, and numerous trout breeding ponds have been established"

H. R. McCrimmon** has described the decrease in catches of Atlantic salmon since colonial times, the development of the very successful fish hatchery from which many streams were restocked in Ontario, and the scarcity of adults which resulted in the abandoning of attempts to restore salmon in Ontario about 1880.

Between 1944 and 1948 about 35,000 Atlantic Salmon fry from the Glenora fish hatchery were planted each year in Duffin Creek in various sections totalling about twenty miles of stream course, at the rate of about one fry per yard. Lethal temperatures were reached in several of the stream areas

* Lizard, K. N. Valley of the Humber, Toronto. (The map is erroneously listed as 1800.)

† Farewell, J. E. History of Ontario County, 1907. p. 47.

** McCrimmon, H. R. Reintroduction of Atlantic Salmon into Tributary Streams of Lake Ontario. Ontario Department of Lands and Forests, 1945.

Stream Studies of Planted Atlantic Salmon. Journal of the Fisheries Research Board of Canada, 11, 1954.

and many of the fry were killed, but about 3 per cent of those distributed each year grew to be smolts and descended the stream each year. The salmon grew similarly to those of maritime streams. It was noted in the report by McCrimmon that the water turbidities observed were not harmful to salmon fry and par. Turbid waters probably offered these fish good protection from predation. Those fry which inhabited riffles without large pools escaped predation from brook trout much more easily than those which were placed in the pools. The experiment is now generally considered to have shown that further attempts to introduce salmon in the Rouge or Duffin Creek or similar streams would not be successful. However, it is possible that this introduction may have affected the populations of brown trout and brook trout. '

2. Methods

The procedure adopted followed closely that used in previous surveys made by the Department of Planning and Development in other river systems. The various rivers and their tributaries were visited at 310 "stations". The stations were from half a mile to three miles apart on each stream course. The topographic features of the valley and the erosion, vegetation, volume of flow, turbidity, temperature and type of bottom were listed for each station. At all suitable stations collections of the aquatic insects and other invertebrates were made. At most of the stations collections of fish were also made. The collections were later examined and classified, and were used in zoning the various sections of the river, as shown on the accompanying map.

The aquatic insects such as mayflies, stoneflies and caddisflies were most useful for this purpose, since many of them are reliable indicators of the stream conditions at the critical time of year. Some species are confined to waters which remain cold and usually clear in summer, such as trout waters. Other species are indicators of permanent flow or of

polluted water or of the maximum summer temperature of the water. Thus the potentialities of a stream for particular species of fish are indicated. Fish collections and records of maximum-minimum thermometers substantiated these findings at their particular stations.

Since the procedure here used follows that of previous river surveys, it allows close comparisons of the characteristics of many rivers. The present criteria and methods were developed from more intensive year-round research carried out by Dr. F. P. Ide, of the Department of Zoology, University of Toronto, on parts of the Nottawasaga River and Algonquin Park streams, already reported on*, and on other streams in Southern Ontario. The analysis by J. P. Hallam† of previous river surveys made by the Department of Planning and Development was also found useful, as was previous work by C. W. Creaser**.

The streams were examined in May or June, 1954, and many of them were examined only once. It was therefore necessary to rely partly on deductions made from the presence or absence of species known to be reliable indicators.

* Ide, F. P. The Effect of Temperature on the Distribution of the Mayfly Fauna of the Stream. University of Toronto Studies, Biology 39, Ontario Fisheries Research Laboratory, Publication 50, 1935.

Ide, F. P. Quantitative Determination of the Insect Fauna of Rapid Water. University of Toronto Studies, Biology 47, Ontario Fisheries Research Laboratory, Publication 59, 1940.

Sprules W. M. An Ecological Investigation of Stream Insects in Algonquin Park, Ontario. University of Toronto Studies, Biology 56, Ontario Fisheries Research Laboratory, Publication 69, 1947.

† Hallam, J. B. Habitat and Associated Fauna of Selected Species of Fish in Ontario Streams. M.A. Thesis, University of Toronto, 1954.

** Creaser, C. W. 1930. Relative importance of hydrogen-ion concentration, temperature, dissolved oxygen, and carbon dioxide tension on habitat selection by brook trout. Ecology, 11: 246 - 262.



ROUGE, DUFFIN, HIGHLAND AND PETTICOAT WATERSHEDS

DEPARTMENT OF PLANNING & DEVELOPMENT SURVEY 1954

BIOLOGICAL CONDITIONS OF STREAMS

(Common summer conditions)

- PERMANENT FLOW COLD
Temperature not above 75°F
Favorable for speckled trout
- PERMANENT FLOW WITH INTERMEDIATE TEMPERATURE
Large temperature variations in lower sections. Trout may be found
in spring, but summer temperature not suitable
- PERMANENT FLOW WARM
Suitable for centrarchids primarily
Not suitable for trout, bass, and other species
- DRIES COMPLETELY OR DRIES TO STANDING POOLS
- STREAM COURSES NOT EXAMINED. Lakes and ponds were not examined

SCALE 1 inch = 1 mile. Scale bar from 0 to 5 miles.

This trout stream 4 miles north-east of Stouffville has fair rock cover but lacks depth of water and shade.



Many of the tributaries of the Rouge River are merely straight ditches with no cover, such as this one 7 miles north-west of Markham.



This culvert passes under the remains of a mill and some burned-out houses at Stouffville. Wastes pass into the stream and refuse is thrown into it here.



3. Permanence of Flow and Summer Temperatures

The permanence of flow and the summer temperature that can be expected in the river are shown on the accompanying map "Biological Conditions of Streams". It is at once apparent from the map that the best spring sources occur all along the north end of the watershed in those parts where the sands and gravels of the kame moraine lie over more impermeable material. In one large sector in the north-east corner of the watershed the sand deposits are so thick that no springs or watercourses could be found. Almost all of Petticoat Creek and the streams running into Frenchman's Bay dry up completely.

The temperature conditions shown on the map need no explanation. The excessive flows accompanying the 1954 hurricane may have scoured the streams enough to alter the locations of deep seepage in the stream-bed in a few stations but these differences will be slight.

4. Pollution

At 18 of the 312 stations pollution of some kind was reported. Almost all of these cases were on streams which later dried to "no flow". Trash and garbage were noted in several dried watercourses and in one case garbage was being dumped into a trout stream. The locations of pollution of streams are available for reference, but there was no evidence of serious effect on the fauna from the information on the report forms. Some streams may appear offensive in appearance and odour but the fauna may remain healthy. It is also true that bacterial pollution is often found in waters that appear clear. The pollution as considered in this section is that affecting fish survival. The removal of turf and topsoil and the storm drains from land subdivided for building will probably increase the pollution of the Rouge River in the future. It is recommended that the Conservation Authority urge the installation of a permit system for every new outlet, large or



This tributary of Duffin Creek in Concession II of Uxbridge Township is a spring-fed stream providing excellent fishing. Passing through willows, it is shaded and cool.



A 9-inch and an 8-inch brook trout were taken in this very small tributary of Duffin Creek, 1 mile east of Brougham during the survey.



Better than average trout cover on Duffin Creek, north-east of Claremont. There are ample logs and shade in the background. The stream would be improved by increasing the depth.



DISTRIBUTION OF GAME FISH

—LEGEND—

- BROOK TROUT (*COTTUS COGNATUS*)
- ▲ SCULPINS (*COTTUS BAIRDII*) +

FROM THE 1954 COLLECTIONS

SCALE 1 1/2 0 1 2 3 4 MILES
 Roads and water courses, with place names, taken from the Department of National Defence
 map to mile maps published in 1942

Poor fish cover in a rapid tributary in the east branch of Duffin Creek 2½ miles south-east of Claremont. There is a shortage of pools and logs in the stream.



This part of the west branch of Duffin Creek has severely-cut banks and a wide shallow stream with silting on the flood plain. This section is 1 mile west of Pickering.



Many of the ponds in the watershed have become filled with silt. This one is a mile south-east of Malvern and was silted during the construction of Highway No. 401.



small, which leads into a watercourse. The Authority could also give a great lead in pollution control by carrying out an extensive educational program concerning pollution. .

5. Fish Distribution

During the survey of 1954 thirty three species of fish were collected in the waters of the R.D.H.F. Watersheds. To these may be added two species, the rainbow trout and the trout-perch, both of which have been recorded in one or more of the river systems.

The chief fish species which are not included in this list, but which probably occur in the watersheds, are the American eel and the hog sucker.

A few other comments on the list follow.

Apart from brook trout the six commonest species found, in order, were the blacknose dace, the creek chub, the white sucker, the common shiner, the redbelly dace and the redbside dace. Brown trout and brook trout are commonly introduced although brook trout are native to these waters. Experiments have shown that the native brook trout spawned in these rivers, usually survive longer than brook trout introduced from hatcheries. The brown trout, although its absolute lethal temperature limit is about the same as that of brook trout, appears to thrive better in slightly warmer water, and is found in Duffin Creek down to the vicinity of No. 7 Highway.

No smallmouth bass were taken although a few probably occur in some of the lower sections of the river. Most of the remaining species in the list are small minnows and darters not of special interest to the angler.

There is no statistical evidence that fishing success has declined, because the fishing effort and the resultant catch have not been measured.

6. Stream Improvement

Many of the tributaries now fall far short of the ideal in their amount of cover and shade for trout.

LIST OF FISHES OF THE R.D.H.P. WATERSHED FROM THE 1954 COLLECTIONS

The arrangement follows that of "A List of Ontario Fishes", manuscript by Dr. W.B. Scott, Royal Ontario Museum of Zoology, 1946, amended 1955. The names follow those of "Freshwater Fishes of Eastern Canada" by W.B. Scott, University of Toronto Press, 1954.

* Sea lamprey	Petromyzon marinus
American brook lamprey	Entosphenus lamottenii
* American smelt	Osmerus mordax
* Brown trout	Salmo trutta
† * Rainbow trout	Salmo gairdnerii
* Brook trout	Salvelinus fontinalis
Common sucker	Catostomus commersonnii
Carp	Cyprinus carpio
Longnose dace	Rhinichthys cataractae
Blacknose dace	Rhinichthys atratulus
Creek chub	Semotilus atromaculatus
Redside dace	Clinostomus elongatus
Redbelly dace	Chrosomus eos
Golden shiner	Notemigonus crysoleucas
Fathead minnow	Pimephales promelas
Bluntnose minnow	Hyborhynchus notatus
Common shiner	Notropis cornutus
Spottail shiner	Notropis hudsonius
Rosyface shiner	Notropis rubellus
Spotfin shiner	Notropis spilopterus
Mimic shiner	Notropis volucellus
* Brown bullhead	Ameiurus nebulosus
Central mudminnow	Umbra limi
* Northern pike	Esox lucius
† Trout-perch	Percopsis omiscomaycus
* Yellow perch	Perca flavescens
Johnny darter	Boleosoma nigrum
Iowa darter	Poecilichthys exilis
Rainbow darter	Poecilichthys caeruleus
Pumpkinseed	Lepomis gibbosus
* Rock bass	Ambloplites rupestris
Slimy sculpin	Cottus cognatus
Mottled sculpin	Cottus bairdii
Brook stickleback	Eucalia inconstans

Fishes which are of special interest to the angler are starred* in the above list. Those not collected in the 1954 collections, but for which there are other records in the files of the Royal Ontario Museum of Zoology, are marked†.

The distributions of brook trout and the sculpins (a genus found only in cool waters) are shown on an accompanying map. The various species of sculpin are not separated on this map.



Michigan Dept. of Conservati

Single-wing deflectors in a trout stream. These are log cribs 30 inches wide and 30 inches high. The logs are wired and stapled to posts. Log spreaders are placed at intervals along the structure. The interior space is filled with gravel and sand, and the top is well sodded to prevent surface erosion and to improve the appearance. The wings are installed at an angle 35°-45° to the direction of the stream, with the terminal end down stream from the base.



Michigan Dept. of Conservati

Single wing deflector made of three logs fastened together and staked securely to the bottom. Opposite this deflector a log bank cover can be seen. This is now partly overgrown with sod and brush. A bar has already started to form below the deflector. This device has proved a very effective stream improvement.

Owners and lessees of stretches of the rivers should therefore be encouraged to install low dams and deflectors which will force the stream to dig holes but will not raise the temperature of the water as large impoundments do.

To control bank erosion, owners should be encouraged to make stream bank plantings such as Fragile Willow (*Salix fragilis*) which does not tend to spread out into the fields. Where streams have been ditched the slope of the spoil bank to the streams is often too great. Re-working of some of the spoil banks to a gentle slope, and the sowing of various grasses such as Reed Canary Grass, would certainly reduce the bank erosion.

Since the stream bed conditions have been much altered by the flood no specific improvements to particular areas are noted. Fencing of streams from cattle and the provision of rubble at specified cattle crossings are obvious improvements needed.

7. Ownership

Good trout water open to the public and within easy access from the large centres of population is rapidly becoming a rarity. Some governments, for example that of New York State, have already acquired stretches of first-class trout rivers so that they will not be lost to the general public. The Conservation Authority might acquire or urge the acquisition of one or more good stretches of Duffin Creek for the public.

The Conservation Authority could also give a demonstration of stream improvement for fish, either by installing low dams and deflectors and planting trees for shade, or by constructing one or more by-pass ponds.

8. Farm Fish Ponds

There is ample room for improvement of this type of fishing. The chief research on management of farm fish ponds has been carried on in southern and warmer climates,

and therefore the findings cannot be applied without qualification to an area having the climate of Southern Ontario, but some definite recommendations may be made. Suitable methods for the construction of six types of farm pond are given in a bulletin, "Farm Ponds", which may be obtained from the Ontario Department of Agriculture.

From the fisherman's point of view, farm ponds are of two main kinds:

(a) Trout Ponds

The first is the cool pond with continuous inflowing water and maximum temperatures at the surface of about 75° Fahrenheit with cooler bottom. Ponds of this type are adapted to the production of speckled or brown trout. They are usually placed near the headwaters and may range in size from about an acre to 8 or 10 acres. Depth should be 10 feet or more in the deepest part. Spring flow of as low as half a cubic foot per second will maintain a pond of one acre.

The outlet of each dam should be a pipe (with a screened inlet at the bottom of the pond) rising close to the normal surface level and there passing through the dam, so that cold water is drained from the bottom and the warmed surface water is not allowed to flow over the dam. The surface water in the pond serves as an insulating layer, and the water below the pond has scarcely been heated by its passage through the pond. The pipe should be of such a size as to discharge the minimum summer flow. In flood time the additional flow would pour over the dam at a suitable outlet, or be carried around it by a grassed spillway.

The by-pass type of pond has two particular advantages for the production of either speckled or brown trout. A pond of this class is built close to but not on a permanent stream and gets its name from the fact that the water supply is by-passed through a pipe from the stream to the pond. The first advantage is that there is no danger of

the pond filling up with silt, because any excessive run-off goes down the permanent stream channel and not through the pond. The other advantage is that by controlling the amount of cold water entering the pond the temperature of the pond may be adjusted to give the maximum growth rate in the fish kept there.

However, trout ponds do not normally have spawning beds for trout and, therefore, must be managed on a put-and-take basis, i.e. stocked artificially.

(b) Warm-Water Ponds

The second and commoner type of farm pond is the warm-water pond. Most farms have at least one low spot suitable for a fish pond. It is frequently good practice to have separate ponds devoted to wildlife and fish and to control the aquatic plants in the fish pond.

In managing warm-water ponds for fish the following points should be kept in mind.

(1) A minimum depth of 15 feet over at least 25 per cent of the pond should be planned to avoid excessive winter kill, probably the critical factor in fish survival in farm ponds in Ontario.

(2) If suckers, carp or large numbers of minnows are already present in the pond, it is usually best to destroy all fish in the pond before stocking.

(3) It is often necessary to control existing aquatic vegetation. There are both mechanical and chemical methods available.*

(4) There have been few tests made in Ontario of the efficiency of applications of fertilizer in increasing the crop of plankton, the smaller aquatic invertebrates. The research now being carried out in this field may lead to application of fertilizers such as 8-8-4 becoming more general.

* Speirs, J. Murray. Summary of Literature on Aquatic Weed Control. Canadian Fish Culturist, 3:(4); August 1948.

(5) Since many of the species commonly recommended for introduction grow very slowly in Ontario waters, research to determine the most satisfactory species will be needed. New ponds and those in which the previous fish have been destroyed might be stocked experimentally with a combination of largemouth bass (Huro salmoides) and bluegills (Lepomis machrochirus) at the rate of 100 bass and 1,000 bluegills per acre. Fishing should be deferred until some of each species have spawned successfully.

The chances of success with these species would be greatest if the pond was situated within 5 to 10 miles of Lake Ontario, in the part of the watershed with a relatively mild climate.

RECREATION

CHAPTER 1

INTRODUCTION

This section of the report has three objectives:

1. To summarize briefly the importance of public lands for recreation.
2. To select those lands lying in the R.D.H.P. Watersheds which seem to be both needed for public use and available at a reasonable price.
3. To recommend the alternative methods of acquiring or developing these lands.

The way in which people use their leisure hours greatly influences physical health, mental stability and personal character. Good public recreation facilities are now recognized as a sound social investment. There is an urgent and constantly growing need for such facilities within the valleys of the Rouge River and Duffin, Highland and Petticoat Creeks. Acquisition of lands into public ownership is the first requirement. Developments of the acquired lands can be adjusted as the population grows. The R.D.H.P. Conservation Authority can take an active part in both of these programs.

The economic, social and physical factors underlying the present situation must be recognized in preparing a sound and comprehensive plan.

1. Populations

About 1,400,000 people or 29 per cent of the total population of Ontario live within a 25-mile radius of Markham, which lies in the centre of the R.D.H.P. Watershed. If present trends continue the population in this area will rise to about two million persons in the next 25 years. Metropolitan Toronto with a present population of 1,200,000 lies immediately to the west of the watershed, and much of south-eastern

Metropolitan Toronto lies in the southern section of Highland Creek and the Rouge River. Here the spread of subdivision is rapidly converting the rural landscape into an urban environment. Oshawa, with approximately 46,000 people, lies less than ten miles from the eastern extremity of Duffin Creek. The rapidly expanding urban areas scattered along Highway No. 2 between Toronto and Oshawa include a belt of dense settlement across the southern section of these river basins. Functioning largely as a dormitory area for people working in the industrial and commercial developments of Metropolitan Toronto and Oshawa, this ribbon of urban growth will continue to expand until most of the intervening open spaces between existing built-up areas are filled for a considerable distance to the east of Toronto. Many villages in the interior of the watershed, such as Markham and Agincourt, are also rapidly developing in a similar manner.

2. Recreation Needs

A new attitude has developed towards the position and importance of recreation in the life of the individual. Shorter working hours, paid vacations and increased wages have provided people with the leisure time and money with which to enjoy a wide variety of activities. The constantly accelerating tempo of modern life places a noticeable strain on the health and stamina of the average person so that definite periods of rest, diversion and retreat have become essential. Outdoor recreation is one of the chief solutions to this problem.

While the need for lands for recreation increases, the best land available for recreation is decreasing. Some farmers are securely fencing their river-front property and heavily posting it with "no trespassing" signs in an effort to exclude the host of Sunday motorists who now roam the countryside in search of places to picnic.

This is chiefly the result of the bad habits of a small section of the public, people who indiscriminately destroy trees and fences and leave the area strewn with bottles, paper and garbage.

The continued growth of summer cottages and country estates is also affecting the availability of picnic sites. These developments are naturally located in the choicer areas. The new forms of land use usually result in the strict enforcement of private property rights.

If developments continue at the present rate and no provision is made for public use of riverfront areas, the local residents of the rural townships in the northern sections of the watershed will find that they are cut off from the water. The farm population will suffer as well as the urban residents who visit the area on week-ends.

The privately owned lands in the river flood plains on the outskirts of urban centres have often formed an important recreation resource for the community. While they lay idle awaiting subdivision, or were used as farm lands, trespass was often permitted. Many of the villages and towns of the valley are now undergoing rapid development on their margins. They will soon find themselves surrounded by a solid wall of securely fenced private property which prevents the population in the interior of the municipality from reaching the riverfront easily and shuts out the suburban residents who own homes behind the initial waterfront subdivision. The loss of these resources will be felt by many people, In many cases the situation is already reaching serious proportions.

3. Ways of Developing Parks

The work of four types of organizations, the Conservation Authority, the individual townships, the Municipality of Metropolitan Toronto and the new Parks Division of the Department of Lands and Forests, is closely

interrelated in planning parks in this area.

There is no intention in this report to suggest which areas could or should be acquired and developed by any particular one of these organizations. The primary objective is to focus attention on the areas which should be acquired outright immediately or protected by zoning by-laws. Outright acquisition of the land for public use is, of course, the ultimate goal.

Parks in Southern Ontario (excluding National Parks) are usually developed in one of the following ways.

Small parks are set up and maintained by the Department of Highways of Ontario on land which was purchased in the acquisition of new rights-of-way.

Under The Community Centres Act, which is administered by the Department of Agriculture, small communities may erect Community Centres and lay out athletic fields with parks to fill the requirements of rural areas.

Large municipalities may establish parks within or without their own boundaries under either The Municipal Act or The Public Parks Act. These are the usual type of city or town parks which may be used solely for park purposes or may embody municipal services such as waterworks or sewage disposal plants.

Certain special parks such as the Niagara Parks and the St. Lawrence Parks are administered by commissions responsible to the Lieutenant-Governor in Council.

Provincial Parks such as Algonquin Park and Quetico Park function as wildlife preserves, tourist areas for canoeing, fishing, trailer parking, and sometimes for summer cottages, and are administered by the Department of Lands and Forests.

Recently the Department of Planning and Development has expanded its scope to include parks intended

for more intensive use. Under The Conservation Authorities Act, R.S.O. 1950, Chapter 62, as amended to 1955:

"For the purposes of carrying out a scheme an authority shall have power... to acquire lands with the approval of the Minister, and to use lands acquired in connection with a scheme, for recreation purposes and to erect, or permit to be erected, buildings, booths and facilities for such purposes and to make charges for admission thereto and the use thereof."

(Section 15 (gg)).

Several Conservation Authorities, notably the Grand and Thames, have established recreation areas as a part of flood control and other conservation schemes. These have already proved to be a great benefit, and have shown the enormous demand for park areas. Such recreation developments also offer the Conservation Authority a valuable medium of publicity. For many people the recreation schemes proposed in this report, when established, will be the first personal contact they will have with the work of the Authority.

There need be no overlapping in the setting up of parks, since each type of park serves a special need and is administered by the Department, Municipality or other group most closely concerned with that need.

The National Trust in England has acquired areas for the public in a very different manner which is of special interest. The objectives in England were:

1. To protect and, if necessary, to acquire for the public some of the finest structures (e.g. town and country houses, mills, bridges, barns, cottages and even streets).
2. To protect fine panoramas, whole stretches of countryside, bodies of water, pieces of coast-line and certain mountains for public use.
3. To protect or acquire areas of special interest because of the rarity or diversity of the geology, fauna or flora.

The original Trust was a private non-profit company. In 1907 the National Trust was incorporated by

Act of Parliament. The Trust now owns many historic buildings and almost 150,000 acres of land. The Trust accepts areas varying from less than half an acre to 10 square miles. It owns numerous large houses and protects by restricted covenant many others. The Trust is not financed by the British Government but by private donations. It now accepts only estates which are self-supporting, or gifts of structures or land which must be adequately endowed.

The functions of this organization are included here to indicate that areas in Ontario similar to those acquired by the National Trust may be retained for public use by means other than large contributions from the Government or the Authority concerned. There are owners of land in Ontario who would be willing to bequeath part or all of their land, or buildings of historic interest, to a public body, or to covenant with such a body so that land might be worked but still made use of by the public. There is no reason why such properties should not be thus bequeathed to Conservation Authorities who could provide continuity of control, technical supervision and adequate maintenance.

CHAPTER 2

LAND TYPES FOR RECREATION IN THE WATERSHED

There are three distinct kinds of land and water in these watersheds, all providing recreation resources. These are:

1. The tumbled sandy hills of the Oak Ridge or interlobate moraine, which forms the northern divide of the drainage basins;
2. The river valleys and rolling plains stretching southward from the base of the interlobate moraine to the lakefront;
3. The shore and waters of Lake Ontario.

1. The Northern Hills

The northern sandy hills abound in springs and kettle or "pothole" lakes. This part of the watershed is a natural part of the planned "Outer Green Belt of Metropolitan Toronto"*, which stretches from near Oshawa to the upper reaches of the Credit Valley, with a part of the Niagara Escarpment. Much of this hilly belt in the R.D.H.F. Watersheds consists of steeply sloping, droughty, erodible sandy soils of low agricultural capacity and should undoubtedly be devoted to recreation and reforestation uses. The steep slopes and broken terrain are ideally suited to skiing, tobogganing and hiking. The cold, spring-fed streams and ponds form a suitable habitat for trout, while the warmer and deeper waters of the small lakes and ponds scattered throughout the area often provide excellent swimming and fishing.

The large and long-established cottage colonies on Musselman and Wilcocks Lakes lie just beyond the northern boundary of the watersheds. In recent years more and more people have acquired frontage on the smaller headwater streams and lakes of these river basins as cottage sites. Considerable land has been bought throughout this hilly belt for use as

* Toronto City Planning Board Report, 1942.

larger summer residences and country estates. In many instances these are coupled with reforestation schemes and limited farming operations. The headwaters of Duffin Creek in the vicinity of Glen Major have been developed by a private fishing club.

Many sections of this belt of hilly terrain are ideal for the development of public parklands suitable for year-round recreation. However, due to the particular land-holding pattern throughout the area, limited development is possible here at the moment. Only one Conservation Area has been recommended in this part of the watershed - that at Bond Lake. It may be possible to institute recreation schemes of various kinds on some of the lands purchased primarily for reforestation purposes. As long as the holding and land use pattern of this area remain relatively static, there will be little damage to its possibilities for recreation. However, the Authority should keep a close watch on land transactions and developments within this hilly belt with a view to safeguarding its value for recreation and to the possibility of securing some of the more desirable sections as public parkland.

2. The Plains and River Valleys

The recreation potential of the level to rolling plains lying between the base of the Oak Ridge moraine and the lakefront is mainly confined to the river valleys which traverse the area from north to south. In crossing these plains, which vary in places from 15 to 20 miles in width, the streams descend from an altitude of 800 to 900 feet to the 245-foot level of Lake Ontario. Moreover, the plains themselves vary considerably in structure and origin. Therefore the valley forms of the area show great variation within short distances. The courses of all the streams can be divided into three readily recognizable valley types of differing recreation value.

In the northern section of the plains the valleys tend to be small and open. The rounded contours of the grassed and wooded slopes lead gently away from the water-courses towards the surrounding agricultural lands. There is nothing spectacular or unique about the valley structure and pattern of this area, but the pleasant tranquil rural atmosphere of some of the more secluded sections makes them very suitable for the development of cottages and suburban homes. Small ponds for ornamental and recreation uses can be easily constructed on many of the streams. Public roadside picnic sites could be set aside along many of these river banks, but this area does not contain lands suitable for large-scale regional parks comparable to those in other sections of the R.D.H.P. Watersheds. Of course, many of these river valley areas in the immediate vicinity of the built-up centres play an important role in an over-all community park program, as indicated by the Cedar Grove Conservation Area discussed in Section 7 of Chapter 3 of this report.

These rivers rapidly deepen and enlarge their valleys as they approach the shoreline of the former glacial Lake Iroquois. The old shoreline runs across the R.D.H.P. Watersheds diagonally from Greenwood to a point about a mile north of West Hill. In the case of Highland Creek, the Rouge River and the east branch of Duffin Creek, the widening of the valleys is greatest in the sand plains immediately south of the above-mentioned shoreline. However, on the west branch of Duffin Creek the valley is widest and deepest north of the Iroquois shoreline at Dixie and becomes narrower in the plains to the south.

These sections of the rivers undoubtedly form the choicest recreation assets in the interior of the R.D.H.P. Watersheds. Heavily wooded and deeply entrenched below the level of the surrounding landscape, the picturesque valleys present an atmosphere of seclusion and remoteness which is ideal for the development of large multiple-purpose

conservation areas. Four of the most important conservation areas recommended in the report are associated with these valley lands.

The importance of developing these areas as public lands can best be seen when they are related to the population pattern of the region as a whole. The gorge-like valley sections of Duffin Creek that have been recommended for development at Dixie and Greenwood lie well beyond the areas of rapid subdivision within the watershed and can function as recreation areas in the open countryside for some years to come. The situation on the lower courses of Highland Creek and the Rouge River is vastly different. For Metropolitan Toronto, these valleys supply a readily accessible source of excellent potential recreation land whose natural beauty is still almost entirely unmarred by industrial and urban development. For the rapidly expanding centres of West Hill, Highland Creek and Rouge Hill, they constitute the irreplaceable heart and core of a community park system which will be necessary as these areas progressively become built up. Since these valley lands will be required to serve as recreational areas for a dense urban population which will undoubtedly surround them in the next few years, they should be spaciouly designed at the outset.

Urban development is progressing rapidly throughout the lower part of Highland Creek and the Rouge River, and the rural atmosphere surrounding the valleys is fast disappearing. Subdivision is steadily pushing in towards them from all sides and in some places has already reached the rim of the valley. Rising land values are accompanying this development. Immediate action is essential to acquire the recommended areas for the public. Otherwise the prices will become prohibitive, the public will be excluded and the natural beauty of the valleys will also be destroyed by private development.

On Duffin Creek a different kind of valley formation occurs where the stream meanders slowly across level clay plains in a broad open valley. This open valley formation is not found on the lower course of the Rouge River and Highland Creek, where the steep-sided valleys run southward and open on to Lake Ontario through sharply cut notches in the shoreline cliffs. The part of the valley south of Pickering is potential parkland and is discussed in Section 6 of Chapter 3 of this report.

3. The Lakefront

The waters and beaches of the 8.2 miles of shoreline fronting Lake Ontario are obviously an important asset for recreation in the R.D.H.P. Watersheds. However, from the standpoint of public access and possible development, this area raises some exceedingly difficult problems.

The high and relatively inaccessible continuous line of cliffs which rims Lake Ontario from the south-west corner of Scarborough Township to Twelve Mile Point extends eastward across the base of the R.D.H.P. Watersheds. Here, however, their height, varying from 20 to 50 feet, has greatly decreased and their solid front is broken by the outlets of the larger rivers emptying into the lake and at the low-lying sandbars enclosing Frenchman Bay. It is difficult to reach the water wherever the cliffs are present, and the beach at these points usually consists of only a few feet of gravel and stone. During the last few years of high lake levels there has been extensive erosion along this shoreline. The choice recreation areas containing the only really good beaches along this entire stretch of lakefront are associated with small sandbars developed at the mouths of Duffin Creek, Petticoat Creek and the Rouge River and with the long spits fronting Frenchman Bay.

Public access along this shoreline has been unsatisfactory for many years. The problem is now becoming

very acute. That part of Pickering and Scarborough Townships which lies between the Lake Ontario shoreline and the area about Highway No. 2 is developing rapidly. A thickly settled population immediately behind this lakefront will obviously require extensive public beaches. In the near future there will also be a continuous belt of dense urban population throughout the whole southern section of Scarborough Township for a considerable distance back from the line of cliffs extending from the south-west corner of the township to Twelve Mile Point. The residents of this area will be cut off from the shoreline of Lake Ontario by an unbroken wall of sheer cliff, often up to 300 feet in height. Moreover, the beaches at the base of these cliffs consist for the most part of a few feet of mud and stone rubble and are often menaced by the possibility of earth slides from the overhanging and unstable cliffs. Hence the population of this area will seek access to the lakefront at other points. Those in the western end of the township will move towards the already overcrowded beaches of Toronto, as many are now doing. Those in the eastern half of this area will undoubtedly seek their recreation on the shoreline of the R.D.H.P. Watersheds. The pressure for public beaches in this area will be immense.

There are 4 commercial parks along the waterfront. Two of them, Ferguson's Beach and Morgan's Park, lie on either side of the mouth of the Rouge River. Sandy Beach and Glen Avis Park are located at Frenchman Bay, the former on the lakefront and the latter on the bay itself. In total these parks possess approximately 3,200 feet of shoreline, a large part of which consists of reasonably good sandy beach.

Although conditions along this shoreline are undoubtedly unsatisfactory, it is difficult to suggest the proper remedies. Frenchman Bay is obviously the most desirable recreation area. The low sandy spits enclosing it contain the longest continuous stretch of good beach in the area and the only one of sufficient proportions to satisfy the requirements

of the region. The well sheltered waters of the bay are ideal for fishing, boating and swimming. There are no cliffs, and access to the lakefront is simple. However, because of these natural advantages, this area has been extensively developed for cottages and commercial parks. Public recreational development here would require the eventual removal of existing residents. Moreover, it is possible that a part of this bay may be recommended for port development in the forthcoming Official Plan of Pickering Township. However, it should be possible to combine these two uses if regulations to keep the waters of the port clean are strictly enforced. With these facts in mind, an area of public beach along the sandbars fronting the bay has been recommended for immediate development.

Undoubtedly the small beaches at the mouth of the rivers and creeks of the R.D.H.P. Watersheds should be secured and preserved as public parkland. The east bank of Duffin Creek is already open to the public. There are commercial parks on both sides of the mouth of the Rouge. As long as these areas remain as parks, their natural advantages are not likely to be destroyed. However, as the pressure for space increases in this area, they will have to be purchased as public parkland, so they have been included in the Rouge Valley Conservation Area. Meanwhile, no subdivision should be allowed to take place here. These park areas are admittedly small, but due to the scarcity of good beaches in the region, they are precious resources.

The shoreline at Port Union offers some possibility for development as a public beach. At the moment public access to a fairly good sand beach stretching to the east of the boundary road between Scarborough and Pickering Townships is blocked by cottage development. These properties, together with the land lying between the shoreline and the railway tracks, should be purchased and developed as public parkland and beach. The shoreline area to the west of this

road is of practically no value for park development because it contains little more than the steep rock piling along the railway embankment. This scheme is admittedly small, but it is one which will appreciably relieve local pressure and which may be immediately begun at a minimum cost.

A small sandbar across the mouth of Petticoat Creek together with a section of the lower valley itself has been recommended for development. Although very limited in size, this area contains some excellent recreation resources and should prove to be a popular development which the Authority may undertake at a very reasonable cost.

The open farmlands which end at the lakefront in an abrupt line of cliffs are of limited value as recreation areas because of difficulty of access and the poor quality of the stony beaches fronting them. However, public access along the shoreline must be guaranteed in any future subdivision of the lands to the rear.

CHAPTER 3

AREAS RECOMMENDED FOR ACQUISITION

There are three types of land recommended for acquisition and development for recreation. These may be summarized as follows.

Multiple-Use Conservation Areas

Bond Lake Area	250 acres
Highland Creek Area	2,185 acres
Rouge River Area	1,485 acres
Whitevale-Dixie Area	1,062 acres
Greenwood Area	720 acres
Ajax Area	390 acres
	<hr/>
	6,092 acres

Community Park and Historical Site

Cedar Grove Conservation Area	255 acres
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Public Beach Areas

Port Union Beach	7 acres
Petticoat Creek Beach	25 acres
Frenchman Bay Beach	250 acres
	<hr/>
	282 acres

(There are also two Lake Ontario beaches included in the recommended Multiple-Use Conservation Areas.)

The lower reaches of the valleys of the R.D.H.P. Watersheds contain some of the finest recreation resources within and immediately beyond the confines of Metropolitan Toronto. Up to the present time these valleys as a whole have remained comparatively undeveloped and their natural beauty relatively unmarred.

Due to flood hazards, large sections of the valley lands are unsuitable for the construction of permanent



MAP OF
ROUGE, DUFFIN, HIGHLAND & PETTICOAT WATERSHEDS
SHOWING
RECOMMENDED CONSERVATION AREAS

SCALE: MILES

DEPARTMENT OF PLANNING & DEVELOPMENT



A view of part of the lower Rouge Valley showing on the left the southern end of the ridge between the Rouge and Little Rouge Rivers. The woods have many large white pines and sugar maples, amongst other species. The area appears almost untouched, and there is a great variety of shrubs and other ground vegetation. This is probably the most suitable area in the watershed for acquisition as a future example of the pioneer forest.



A very attractive picnic site along the edge of Highland Creek in the area recommended for acquisition.

buildings. In many instances the unconsolidated sands and silts of the steeply sloping valley walls tend to erode when cleared of timber, and hence should be kept in woodland continually.

Almost all of the Highland Creek Conservation Area and part of the Rouge River Conservation Area fall within the boundaries of Metropolitan Toronto and have been previously recommended for greenbelt development by this body. The R.D.H.P. Conservation Authority and Metropolitan Toronto can co-operate fully with the Townships of Scarborough and Pickering in establishing these Conservation Areas, since the ultimate objectives for the use of the land coincide. The Division of Parks of the Department of Lands and Forests is also naturally interested in acquiring or administering public lands for the benefit of the people of the Province as a whole. This Division's interest in Southern Ontario has been intensified during the past year. The greatly increasing need, particularly for public beaches, may make it essential for the Provincial Parks Division to take a part in the developments recommended.

Two of the recommended areas, Greenwood and Whitevale-Dixie, lie in the midst of rural surroundings well beyond the present built-up areas. They could be considered as recreation areas in the open countryside. At the moment the Ajax area also falls into this category in many respects as the site lies well beyond the buildings of the village. The Highland Creek and Rouge areas are in a different category. Urban development now flanks their southern margins. Within a few years they will be characterized as wilderness parks in the midst of urban environment surrounding them on all sides. There is plenty of room for the development of playing fields in many places on the valley flats. These need not interfere with the wildlife and botanical aspects. The provision of swimming facilities along Highland Creek would

eventually be a necessity, since the natural condition is unsatisfactory. Storm drainage from built-up areas does not provide attractive water for swimming. It would probably be essential to develop artificial swimming pools here at an early date.

All of the conservation areas mentioned are threatened by the rapid advance of subdivision which is leaping across the rural countryside rather than advancing steadily from the margin of the established urban cores. However, in this respect Highland Creek and the Rouge are in the most vulnerable position. If they are to be preserved in their natural state and reserved for public recreation, they should be acquired now.

1. Bond Lake Multiple-Use Conservation Area

A 250-acre tract of land surrounding Bond Lake in the north-western extremity of the R.D.H.P. Watersheds is recommended for development by the Authority as a multiple-use conservation area. This is the only section of the chain of hills across the upper part of these river basins that is recommended for a development of this type at the present time. Other areas may be similarly recommended at a later date. The area undoubtedly contains the most desirable potential public parkland in the belt of hilly lands which rim the northern sections of the watersheds. Although not as large as Musselman or Wilcocks Lakes, which lie just beyond the northern boundary of the Authority, Bond Lake compares favourably with these well known resort areas. It is large enough for a development of the type proposed and has the additional advantage of having remained untouched by intensive cottage development.

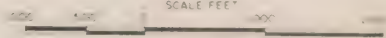
The area immediately surrounding this proposed development is rapidly undergoing subdivision for permanent homes, particularly around Wilcocks Lake. At any time the proposed conservation area could undergo similar subdivision.

BOND LAKE CONSERVATION AREA

LEGEND

--- BOUNDARY
WOODLAND

SCALE FEET

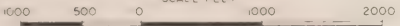


CEDAR GROVE HISTORICAL PARK

LEGEND

--- BOUNDARY
WOODLAND

SCALE FEET



For many years there was a public park at Bond Lake which was owned and operated by the Metropolitan Division of the Toronto and York Radials. The holdings were subsequently sold and the area developed as a private estate. In view of the immense growth of the urban population in Metropolitan Toronto and the rapid subdivision now in progress in the area immediately surrounding the lake, the site should certainly be developed immediately as public parkland.

(a) Description of Property

There is excellent access to the site, since it lies immediately adjacent to Highway No. 11 about four miles north of Richmond Hill. The area would serve as a recreation area for the dense population of Metropolitan Toronto lying to the south and as a community recreation area for the rapidly expanding urban subdivisions on either side of the highway in its immediate vicinity.

Bond Lake, an attractive body of water approximately 35 acres in area, lies nestled in one of the more marked of the low pockets which are common in the belt of hilly terrain stretching across the northern boundary of the watersheds. The waters of the lake are deep and clear. The level is fairly constant throughout the year. Conditions are suitable for swimming, boating and fishing. The lake is surrounded by attractive wooded slopes which give the site an atmosphere of seclusion.

The open, rolling land within the conservation area is now devoted to grain and hay production. About 50 acres lying immediately to the rear of the wooded margins of the lake is in wheat. The rest of the arable land is being used for hay and pasture.

There are a number of buildings on the site. The central buildings of an estate, which include a large modern brick house, lie on the northern shoreline. There are two other houses close to the lake.

(b) Nature of the Development

The usual facilities would be developed at the lake. Picnic tables, fireplaces and hiking trails could be located at various points along the wooded slopes. There is ample space in the open fields for the construction of playing fields and parking facilities.

A certain amount of reforestation would be required immediately. The margins of the conservation area must be screened from future subdivisions by a broad belt of trees. About ten per cent of the whole area would be reforested. Some planting will also be required in the open land for shade and ornamental purposes. An area of wet scrub in the north-west section of the development should also be placed under a forest improvement program.

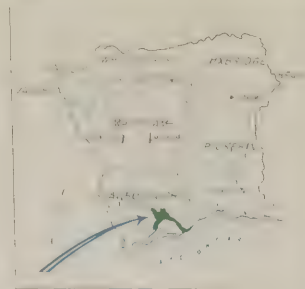
The large estate which forms part of the main core of the conservation area should eventually be purchased. However, this need not be carried out immediately. Certain parts of the lake could be opened for public use and the remainder at a later date. What is immediately required here is the purchase of as much land as is possible within the conservation area and the keeping of the remaining sections as agricultural land or forest. No further building and subdivision should be permitted in the area.

2. Highland Creek Multiple-Use Conservation Area

Approximately 1,265 acres of land in the lower reaches of Highland Creek are recommended for development as a conservation area, with the main emphasis to be placed upon recreation. The area stretches along both sides of the main valley from Danforth Road in the north to the Lake Ontario shoreline in the south and also includes a section of a southern branch of the creek, beginning at the eastern boundary of the Scarborough Golf Club.

This conservation area forms an integral part of the much publicized greenbelt of Metropolitan Toronto.

HIGHLAND CREEK CONSERVATION AREA AND PORT UNION BEACH

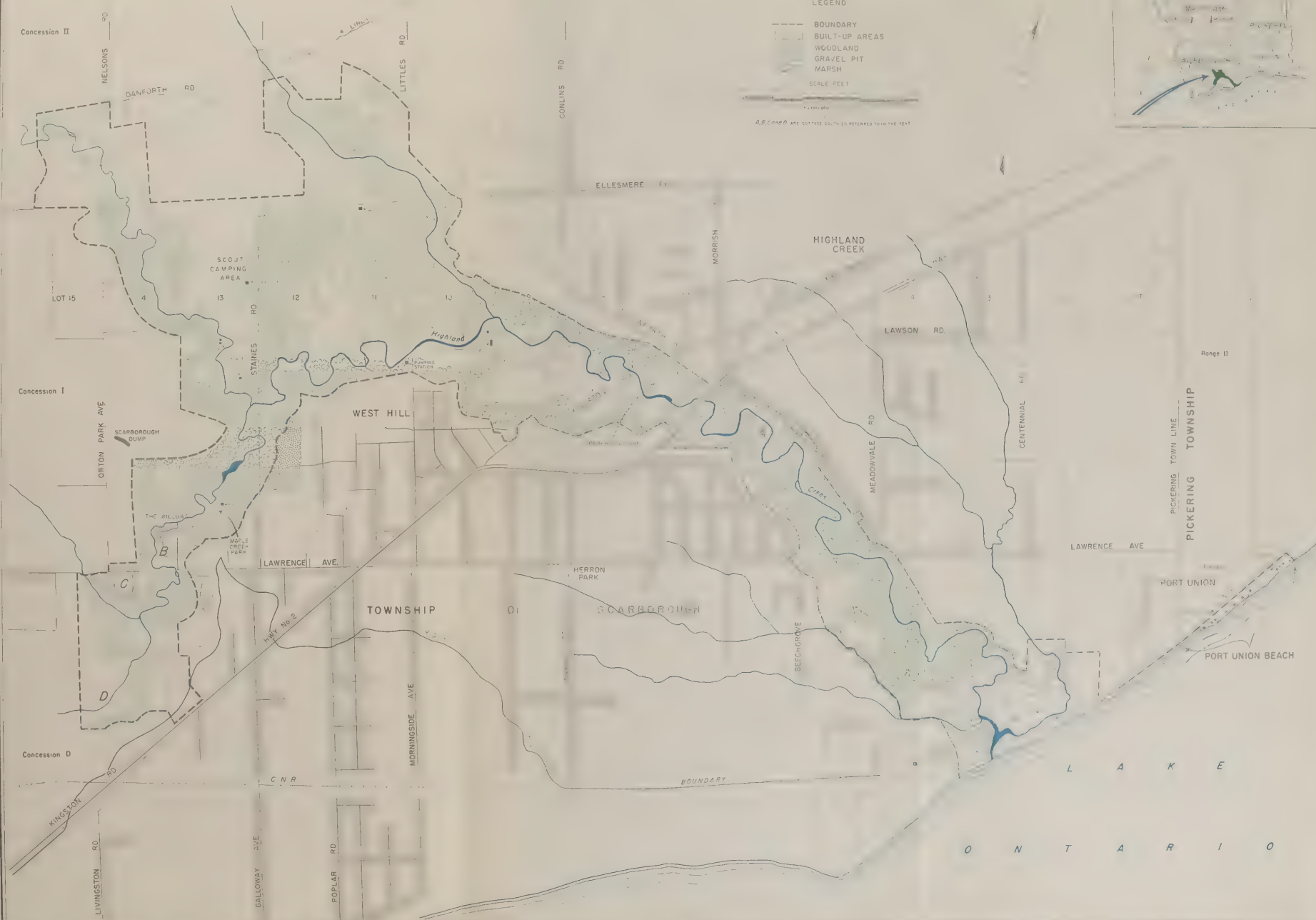


LEGEND

- BOUNDARY
- BUILT-UP AREAS
- WOODLAND
- GRAVEL PIT
- MARSH

SCALE FEET

ARROWS AND COLOURS SHOWN IN REFERRED TO IN THE TEXT



Here there is a spacious and unspoiled reserve of superb multiple-use recreation land of the type that Toronto and the urban areas in the south-western section of Scarborough Township require so desperately. Here also is the irreplaceable core of a community park system for the rapidly expanding urban developments in the south-eastern part of the township. In order to satisfy the requirements for a regional as well as a community parkland, this conservation area must be extensive in design.

Urban development is rapidly closing in upon many parts of this valley. If it is to be saved for public recreation uses immediate action must be taken. The area between the southern rim of the valley and the lakefront is rapidly filling up as subdivision progresses on either side of Highway No. 401. New homes are now being built at many points along the eastern margins of the area as well as the northern.

Large sections of the valley floor are very susceptible to flood damage and should never be used as building sites under any condition. However, cottages have been constructed in many parts of the valley in the past. Because of the housing shortage in the region many of these summer properties are now used as permanent homes whether they are well constructed or not.

During the winter months many of the residents are cut off from direct access to their buildings by car due to the accumulation of sleet, snow and ice on the steep roads descending into the valley. During the spring floods many of these buildings are often seriously damaged. These unsatisfactory developments should be removed from the valley.

The steep valley walls should be kept in forest cover at all times as the soft sands and clays of which they are composed tend to erode and develop gullies. Most of this area has remained in woodland which should be preserved.

The flat plains immediately adjacent to the rim of the valley could be very valuable recreation assets. They provide a means of access to valley slopes leading to the flood plains below. From the lip of the valley there are superb views across these ravines. Unfortunately these factors have also raised the value of the lots along the rim to the point where most of them cannot be considered for purchase for public parkland at the present time. The views from these sites along with the ownership of a section of woodland down the slope of the valley have a strong attraction for prospective home builders. A few of the remaining undeveloped lots along the top of the valley should be secured immediately, so as to allow access and to provide scenic lookouts.

The proposed development fronts upon Lake Ontario and contains about 3,500 feet of shoreline. Although this section is cut off from the marshlands to the north by a double line of railway track, there should certainly be a stretch of lake front within the conservation area. There is access to a field west of the river mouth, by a level crossing which is now in use. From here a steep path leads down the cliffs to the waterfront. The beach is poor at this point but to the west of the base of the cliff there are occasional patches of sandy beach.

(a) Description of the Property

In this section of its course Highland Creek has carved a broad and deep valley into the surrounding sand plains. Over much of the area precipitous cliffs of sand and silt drop a hundred feet or more from the edge of the valley to the river bottomlands below. As a result of the difficulty of access to these ravines they have remained relatively undeveloped, with the exception of the construction of a few cottage colonies close to points of easy approach to one side of road allowances traversing the valley. Lying far below the level of the surrounding landscape and enclosed

An attractive area for a large park close to Highway No. 2A on Highland Creek.



Much of the edgelands along the rim of Highland Creek have been taken over for gravel pits. This operation certainly does not improve the view of the valley.



A part of the housing development, formerly summer cottages now in permanent occupation, in Area A of the Highland Creek Conservation Area.



on all sides by densely wooded slopes, the broad river flats have an atmosphere of seclusion and tranquillity.

There are approximately five and a half miles of river frontage within the conservation area. As might be expected, the stream is subject to frequent changes of course. Abandoned channels which are now dried-up gullies choked with deposits of sand, gravel and boulders are frequently encountered on the flood plains. Local inundations are common after very heavy rains and in the spring a considerable area of the flood plain is often under water for some time. The flow often falls very low after a long summer drought. With the exception of the section immediately to the north of the lakefront, the creek is shallow throughout most of its course, varying in depth from a few inches to a couple of feet. There are a few deeper holes which are satisfactory for swimming. The stream tends to be silted.

Through the summer months most of the land in the flood plain is sufficiently dry for walking and picnicking. However, at the mouth of the Creek there is a large expanse of permanent marsh which extends for some distance upstream. In the whole area 730 acres are in woodland. There is enough diversity in the forest composition to add variety to the scenery and provide interest for the naturalist.

Thirty-five per cent of the wooded area is composed of softwood trees. White cedar is the dominant species in this group. However, white pine, often occurring on the rim and upper slopes of the valley and towering high above the surrounding vegetation, forms a conspicuous and picturesque component of the forest in the lower reaches of the valley. The pines usually vary from 10 to 18 inches in diameter and are therefore large enough to be useful and attractive.

The remaining 65 per cent of the woodland is hardwood. Sugar maple, aspen, red oak and scattered

beech and yellow birch are the dominant deciduous species. White elm, black ash and red maple, along with willow, are the characteristic hardwoods of the poorly drained sites. There is a wide variation in tree sizes among the deciduous species. About 45 per cent of the hardwoods are greater than 10 inches in diameter.

A considerable number of buildings and installations are located within this proposed conservation area. Over a long period of time many will have to be removed if the scheme is to be operated to the best advantage.

There are four separate cottage areas or colonies within the area in addition to a number of scattered developments along more isolated sections of the valley. Many of the buildings, which were originally designed for summer use, are now serving as all-year residences.

One of the largest of these areas is located on the flood plain of the valley immediately south of Highway No. 401 shown at "A" on the map. Here there are about 60 cottages, many of which are of extremely flimsy construction and certainly unfit for permanent residence. During Hurricane Hazel there was substantial destruction in this area and many of the buildings were damaged. There is no doubt that this development should be removed from the valley.

On the valley floor immediately north of the junction of Lawrence Avenue with Highland Creek a cottage colony known as "The Willows" extends along both sides of the river, ("B" on the map). What has been said of the cottage area south of Highway No. 401 also applies in this instance. Damage in this area was heavy during Hurricane Hazel. The main bridge across the river on Lawrence Avenue was washed out and a new one is now being constructed.

At the point where Lawrence Avenue crosses Highland Creek two cottage colonies have developed. Above the valley at Bridgeview Heights Commercial Park there are about 30 buildings constructed in a horseshoe around the outer

boundary of the park ("C" on the map). These buildings are in no danger of flood damage but they were not constructed for use as all-year residences.

In the south-western corner of the conservation area there is a group of cottages ("D" on the map) which are served by a road leading north from Highway No. 401.

Three commercial parks fall within the conservation area, Bridgeview Heights Park is situated high above the valley south of Lawrence Avenue. This park has a central pavilion and refreshment stand in addition to playing fields. Maple Creek Park is located in the valley floor about three-quarters of a mile north of Lawrence Avenue. Here there is a central pavilion and refreshment concession with playing fields and picnic facilities. This is not an elaborate development but the site appeared to be kept in reasonable condition. South of the junction of Highland Creek with Kingston Road there is a third commercial park. The main attraction of this area is obviously the swimming pool created by a small dam across the creek. There are no buildings here, with the exception of a small refreshment booth.

The Crooked Creek Camp of the Boy Scout Association is located on 100 acres of land in the north-western part of the conservation area. Here the land is already being devoted to recreation in a manner in keeping with conservation principles. It is not recommended that the camp site be removed. However, it may be necessary to open a public right-of-way through a small section of the northern part of this property to provide a link with the area to the north. By way of compensation, the camp would be assured of the preservation of the surrounding area in its natural state and the use of hiking trails leading down the valley as far as Lake Ontario. A dam has been constructed on this property to provide a swimming hole with a maximum depth of about 6 feet. A small administration building, a winter camp hut and a picnic pavilion have been erected.

On the western and northern limits of the conservation area much gravel has been extracted in past years. At the junction of Danforth and Littles Road a gravel company has an operating pit. The plan does not call for the cessation of activities here but rather that the pits should be reconditioned when they are exhausted, and should then be included in the conservation area. In the south-western section of the area there is a large expanse of scarred lands on the site of former pits of another sand and gravel company. This area fronts upon Highway No. 401 and offers the only suitable entrance to the south and western sections of the park from this main traffic artery. This area should be secured at the earliest possible moment, as otherwise it is certain to be used for building purposes in the very near future.

At the present time a sewer is being laid through this valley to the new treatment plant on the lake-front. The pipeline should cause no undue interference with this scheme.

(b) Proposed Development

It is obvious that this area cannot all be purchased at once. However, it is essential that no further developments occur here which would be detrimental to the completion of the plan. The rapid subdivision occurring on all sides places the whole area in danger and especially all the level lands above the lip of the valley. A systematic land acquisition program should be devised which will secure the most vulnerable areas immediately and bring together a core of public parkland which can be put into operation in the near future. This core can then be progressively expanded until the entire scheme is completed.

A conservation area of this magnitude can fulfil a wide variety of recreation activities. The upper reaches of the creek contain some ideal campsites, as

evidenced by the Crooked Creek development of the Boy Scouts.

Excellent hiking and nature trails can be laid out in the valley. These should be useful to local schools for practical instruction in nature courses as well as of general interest to the public.

3. Rouge Valley Multiple-Use Conservation Area

This proposed conservation area, embracing approximately 1,485 acres of land, extends along both banks of the Rouge River northwards from the Lake Ontario shoreline and also includes a section of beach extending to the east and west of the mouth of the river.

Large sections of the bottomlands of this valley are unsuitable for permanent buildings. Here also the precipitous valley walls of sand and silt would be exposed to gullying and erosion if the forest cover were removed. This area contains the choicest block of natural unspoiled wilderness in the lower reaches of any of the valleys of the R.D.H.P. Watersheds. Such an irreplaceable area should obviously not be split into small private estates and securely fenced to exclude the general public.

The area might be expanded on its northern margins along the Little Rouge Creek at a later date. The grounds of a large estate on the banks of the stream contain some superb recreation lands which might be incorporated in the future. A large area of sand and gravel plains immediately to the east of this estate could be reforested and absorbed into the area at the end of the present extraction operations.

In the future the western boundary could be extended upstream as far as Woodland Park. This section contains first-class recreation lands which would form a valuable addition to this scheme. These should not be lost to subdivision.

The project, like that on Highland Creek, should be begun immediately if some of the valuable

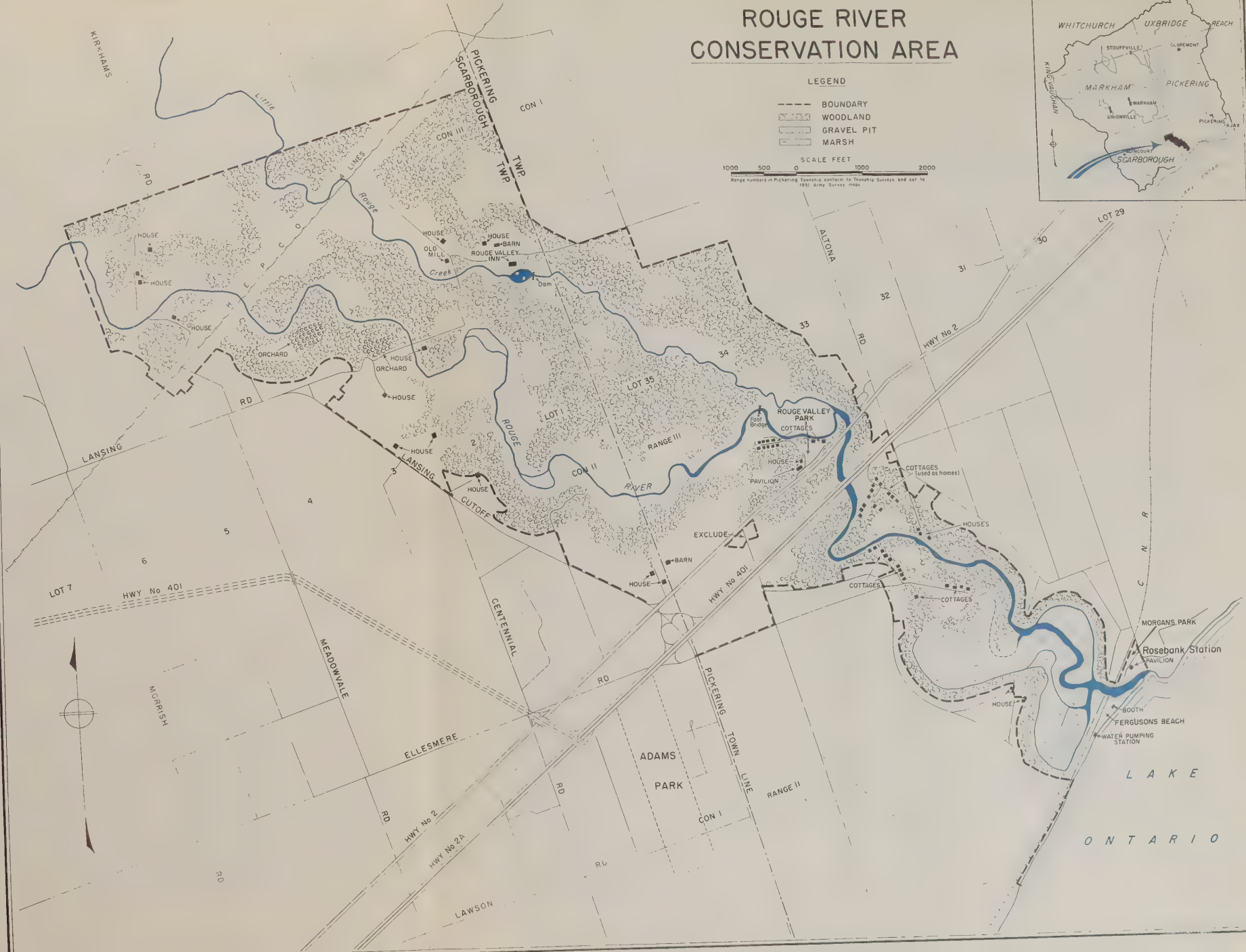
ROUGE RIVER CONSERVATION AREA

LEGEND

- BOUNDARY
- WOODLAND
- GRAVEL PIT
- MARSH

SCALE FEET
1000 500 0 1000 2000

Range numbers in Pickering Township conform to Township Surveys and not to 1951 Army Survey Maps



recreation assets of the area are not to be lost. Most of the linear belts along the rim of the valleys near Highway No. 401 have been built up. This is unfortunate, as they provide a superb view across this magnificent valley. The remaining land is certainly in danger of being lost to the public. Whatever sections are now vacant here have been included in the scheme. When the buildings in this area become obsolete they should be cleared out and the land incorporated into this development.

Up to now the margins of the valley to the north of Highway No. 401 have remained comparatively undeveloped. The section along the Lansing Cut-Off about a half-mile south of the Glen Eagles Hotel is an exception to the above. Subdivision is also progressing rapidly along the Altona Road in an area that has been orchards and market gardens for many years. The eastern margins of the development along the road leading to the Rouge Valley Inn are also in imminent danger of encroachment by the subdivider. Much of this land is now offered for sale.

(a) Description of the Property

This is another splendid valley rivalling that of Highland Creek. It is carved broadly and deeply into soft sand and silt deposits. Along the west side of the Little Rouge Creek, just above its junction with the main stream, the bedrock shales which underlie this whole region are exposed in a small section of the bank. Over most of the area the flood plain of the river lies between 100 and 150 feet below the upper rim of the valley and is often enclosed on both sides by precipitous unscalable cliffs.

However, in the northern half of the development there are two distinct valleys, those of the Little Rouge Creek in the east and the main Rouge River in the west. Just above their junction these valleys are separated by a high and well timbered ridge of land from the top of which there are some superb views across the entire lower section of the

The sand spit and bar, which has formed eastward from the mouth of the Rouge River, form the best strip of beach in the western part of the R.D.H.P. Watershed. The pond in the foreground is an excellent and safe place for children to paddle.



The marshes north of the railroad bridge at the mouth of the Rouge River are of special interest to the naturalist and fisherman.

A small dam has been very successfully established on the Rouge above No. 2 Highway. In this view, taken September 26, 1956, most of the stop logs have been removed. Later the remaining stop logs and the posts will be taken out for the winter. This dam creates a very attractive swimming pool, now used commercially. The area is very popular, and it is very important that it should not be split up for summer cottages.



valley. Because of the somewhat isolated position of this ridge the vegetation and animal life are of special interest. There is a sharp contrast in the vegetation on the northern and southern sides of the ridge.

The lakefront beaches adjacent to the mouth of the river are an important component of this conservation area. There is a beach about 750 feet long, west of the mouth of the river. This sand and gravel strip gradually narrows from about 50 feet in width close to the mouth of the river to only a few feet at the base of the rock piling against the C.N.R. railway track. About midway along the beach a new pumping station is now under construction. This should not seriously interfere with the public use of the remainder of the beach. Previous to Hurricane Hazel there was a fine sand-bar or spit extending outwards from the west side of the mouth of the Rouge River. Unfortunately this has now disappeared. However, since the hurricane an excellent beach has developed eastwards from the mouth of the river. A large spit and bar has been formed here which is now the best strip of beach on the entire west half of the shoreline of the R.D.H.P. Watersheds.

From the northern limits of this conservation area to Lake Ontario there are approximately 5 miles of stream running through the heart of the development. Separated by a belt of high land, the two main branches of the Rouge River wind their way across a level flood plain enclosed by well-wooded steep-sided valley walls, and join near the Kingston Road. Nearly two and a half miles of the main stream lies in this section of the conservation area while the Little Rouge Creek is more than a mile long, in the parkland. Fluctuations of level and changes of course are a common occurrence. Spring floods inundate fairly extensive areas of bottomland. The summer flow varies from 1 to 4 cubic feet per second. Sand and gravel deposits choke large sections of the river bed,

Part of the unspoiled forestland lying between the Rouge and Little Rouge Rivers near their confluence. This area may well provide the last opportunity for the residents of the Toronto region to acquire a stretch of fine forestland within easy reach. This area is described in detail in the Wildlife section of this report, where it is listed as Area G.



An old pavilion and picnic area on the east side of the mouth of the Rouge River. Here the road allowance is littered with refuse. Access to the beach here at present involves a very difficult climb down a steep and often slippery bank, but the picnic area has fine views over the lake. This lies in the proposed Rouge River Conservation Area.



Erosion is one of the chief problems on the Lake Ontario beach. These are groynes and eroded cliffs near Fairport Beach.



making attractive stretches of fast sparkling water. The depths of the two streams vary from a few inches to a couple of feet. While they offer safe bathing and wading for children they are obviously too shallow for swimming. Dams and ponds would have to be constructed for this purpose.

From the junction of the two streams to the lakefront, the river winds for more than a mile. The flow, which is continuous throughout the year, increases to about 8 c.f.s. (summer flow). The stream passes slowly through an extensive marshland area just above its entrance into the lake. Here the stream is wider and deeper but its value for recreation is much reduced because access to it is difficult. Of course the plants and animals of the marsh are of great interest to the naturalist.

Six hundred acres or 40 per cent of all the land lying within this conservation area is wooded. The range of species encountered here lends variety to the landscape and provides a diversity of wildlife habitats.

Conifer cover types occupy 200 acres and form 33 per cent of the total woodland. White cedar, covering 130 acres, is by far the dominant representative of this group. However, white pine and hemlock, either in individual stands or in combination, are a significant component of the total acreage of softwoods. About 70 per cent of the softwood growth is from 4 to 10 inches in diameter. There are several fine stands of white pine and a few of hemlock. Many of the pine reach 18" in diameter.

Hardwoods, covering 411 acres, form the remaining 67 per cent of the forest cover. Sugar maple, either in pure stands or in association with beech and yellow birch, is the dominant species. However, there is a good representation of additional species. The oaks and elms encountered here fall within the 10 to 18 inch diameter class while the remainder of the species are commonly smaller.

During the summer of 1954 an extensive and detailed survey was carried out in the area to assess the botanical and zoological characteristics and peculiarities. The results of this work have been covered in the Wildlife section of the report and need not be repeated here other than to note that it was felt that many sections of this valley were undoubtedly worth preservation from this point of view alone.

While much of this area is a veritable wilderness the entire valley has not remained completely undeveloped. Hence a number of buildings and installations fall within the proposed conservation area.

There are a number of cottages in the bottom of the valley to the north and south of Highway No. 401. A steep road down the east slope of the valley just south of the highway provides access to about 20 cottages on the flood plain of the river. These buildings, which are of modest construction, are being used in many cases for year-round residence. On the west side of the river there is another rapidly expanding cottage colony to which there is access to the valley down a steep road leading off the side road to the Rouge Hills Golf Course. These buildings, which are in some cases on very low-lying valley lands, are susceptible to flood and ice damage and the area should never be used as a site for permanent homes. Just north of Kingston Road on the west side of the valley in the rear of a commercial park there is a third group of cottages. The 10 buildings involved in this development are situated on a terrace well above the level of the flood plain below.

Several commercial parks have been developed in this valley and at the mouth of the river. The Rouge Valley Inn, situated on the Little Rouge Creek in the central part of this proposed conservation area, is undoubtedly the most elaborate of these establishments. A temporary dam has

been constructed across the creek to create a swimming pool capable of accommodating large crowds. A central dining hall and refreshment concession has been built. There is also a small amusement centre constructed on the site.

On the west bank of the river at its junction with Kingston Road there is a fairly spacious commercial recreation centre known as the Rouge Valley Park. This development occupies about a mile of river bottomland on the main branch of the river. More than a hundred picnic tables have been placed along the banks of the stream. A main building which serves as a restaurant and grocery store stands at the entrance. The park occupies some very fine recreation land but at the moment it lacks good swimming facilities.

Ferguson's Beach is situated on a strip of sandy shoreline extending along Lake Ontario westward from the mouth of the river. Prior to Hurricane Hazel there was a superb sandy hook jutting into the lake at this point, which was certainly one of the best beaches in the region; but it was destroyed by the recent hurricane. There is a well built refreshment concession on the beach and a number of canoes are available for rental.

On the opposite bank of the river is Morgan's Park, above a 50 foot cliff. There is a central pavilion and refreshment concession here in addition to parking facilities and playing fields. Since Hurricane Hazel the beach resources of this park have been improved. A large sand and gravel bar was thrown up about a hundred yards to the east. This is now one of the finest beaches west of the bars at Frenchman Bay.

A country estate called Twyn Waters is situated in the heart of this proposed development and might be incorporated in it eventually. Some of the finest recreation land in the valley is associated with this property.

A farmhouse and barn which are in a reasonable state of repair are situated across the road from the Rouge

Valley Inn. There are several buildings alongside the winding road leading north from the Lansing Cut-Off and crossing the main branch of the river in the western end of this development. On the east side of this road just south of the river there is a two-storey brick house in good condition. Three more houses are located on the same side of this road but north of the river. In the valley south of the Glen Eagles Hotel there is an isolated house and shed.

There is a new gasoline station and also a large house on the south side of the Kingston Road, at the brink of the descent down the western slope of the valley. Eventually these buildings, which lie in the heart of the development, should be secured. However, during the initial steps of the scheme they may be ignored.

Very little of the land is in cultivation at the moment. Two small orchards, covering about ten acres, have been included in addition to about 75 acres of cultivated land and improved pasture. Much of the area is used as scrub pasture and a considerable amount could be said to be open idle land awaiting development.

(b) Proposed Development

Because of the interesting physical, botanical and zoological patterns, this conservation area offers the best possibility of any of the valley lands immediately adjacent to Metropolitan Toronto for the development of a large-scale wilderness parkland and nature preserve. The sections most suitable for preservation as nature reserves are outlined in the Wildlife section of the report. Care should certainly be taken to see that these interesting wildlife features are not destroyed.

Because the river is so shallow it will be necessary to construct artificial swimming facilities. The pond which has been formed by damming the river at the Rouge Valley Inn shows how simply this can be done. Similar temporary dams could be constructed at many points in the valley.

There is ample space at various points in these valleys for the establishment of playing fields, picnic tables, fireplaces and large pavilions.

The area lends itself admirably to the development of hiking and nature trails. These trails, together with the previously discussed nature preserves would be attractive and useful to both adults and schoolchildren.

4. Whitevale-Dixie Multiple-Use Conservation Area

One thousand and sixty acres of land are included in this conservation area, which follows the west branch of Duffin Creek from Whitevale to a point about three-quarters of a mile below Dixie. The northern end of the development lies about a mile and a quarter south of Highway No. 7 and the southern extremity is only slightly over two miles to the north of Highway No. 401. Access by car to this site is therefore excellent, and the distance travelled over township gravel roads is short.

Until now the wave of subdivision has not reached this area except at Clarkes Hollow. The proposed conservation area is now a reserve of potential rural recreation land lying in the open countryside. However, it is almost certain that much of the land concerned will be used for suburban homes and estates in the next few years because of its fine scenery and unspoiled rural atmosphere. For this reason it is important that the R.D.H.P. Authority should examine the area immediately while the cost is relatively low. If there is a long delay some of the choicest natural recreation lands may be lost.

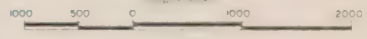
The southern margin of the conservation area adjoins the Manresa Retreat House. Further downstream Sun Valley Park is located. This section of the valley should not be subdivided as at a later date it will probably prove advisable to extend this scheme further downstream. These riverfront areas offer superb parkland for the rapidly expanding



WHITEVALE - DIXIE CONSERVATION AREA

LEGEND

- BOUNDARY
- WOODLAND
- GRAVEL PIT



urban development to the north of Pickering Village.

(a) Description of the Property

The west branch of Duffin Creek has carved a deep and sharp-sided valley into the thick deposits of boulder clay south of Whitevale and into the sandy plains fronting the former shoreline of glacial Lake Iroquois immediately below Dixie. At many points there is a sheer drop of about a hundred feet from the lip of the valley,

This entrenchment below the rolling plains of the adjacent countryside results in a repetition of that atmosphere of detachment already described concerning the Rouge River and Highland Creek Conservation Areas. However, this feature does not continue to the lakefront on Duffin Creek as is the case on the former streams.

There are almost three and a half miles of river course within the area. The waters of the creek are moderately warm but very shallow in many parts. The flood plain is littered with the sand, gravel and boulder deposits of the many former channels. These deposits, together with the eroding clays and sands of the sheer valley walls, make the stream very turbid in flood periods.

However, these reaches of Duffin Creek are very attractive. In many places the stream spills over gravel bars or twists its way through a boulder-strewn bed in a maze of separate channels. There is a ruggedness about the creek at this point which is not found elsewhere in the R.D.H.P. Watersheds.

Four hundred and ninety acres or 46 per cent of the area is now in woodland. About 280 acres or 57 per cent of the woodland is softwood, almost all of which is white cedar. In 84 acres or about a quarter of the cedar woodland, these trees are large, from 10 to 18 inches in diameter, and these are particularly useful for shade. Hardwoods occupy 210 acres or 43 per cent of the total woodland. There are many species of trees represented, of which sugar maple in both

pure and mixed stands is by far the commonest, covering about half of all the hardwood lands. All of the other common trees of this region are found in the woodlands.

The area has been delimited so as to avoid the inclusion of existing buildings as far as possible. About a mile south of Whitevale on the east bank of the creek a small cottage has been recently constructed. It is likely that further summer properties will invade this area in the near future. At Clarkes Hollow there is already a subdivision. About 17 cottages, most of which are now used as permanent homes, form a small colony on the west bank of the river a few hundred yards to the south of the bridge. A barn and a large house with a swimming pool are close to the main road just south of the entrance to this group of cottages. The buildings of this area need not be removed immediately but could be gradually acquired over a period of time. Few of these cottages are suitable for use as permanent dwellings.

A fine new house has just been constructed at the north-east corner of the bridge at Clarkes Hollow. Eventually this property should be acquired, since it lies in the centre of the proposed parkland. Here we have a clear indication of the type of subdivision which will undoubtedly advance into the area soon if the scheme is not carried out.

A road down the west bank of the valley at Dixie leads to a commercial park in the valley floor. This park has been allowed to fall into a dilapidated condition in recent years. Above the east bank of the creek at this point there is an extensive gravel pit operation. As long as this pit is not extended further towards the edge of the valley it should not have any serious effect on the scenery. When the deposits are exhausted the land can be reforested and incorporated into the scheme.

(b) Proposed Development

About 20 per cent of the area should be reforested soon after acquisition of the property. The existing

woodland should be put under a forest management program.

Hiking trails should be established on either side of the stream from Whitevale to the southern margin of the property. A few short access roads will be needed. These would lead from existing township road allowances down to the recreation areas in the valley floor.

Fireplaces, picnic tables and other recreation equipment must be placed about the area. Permanent buildings could not be located on the low-lying flood plain of the valley as the flood hazard here is very great.

Many of the somewhat higher valley bottomlands, although they are unsatisfactory for permanent buildings, could be developed as playing fields in addition to some of the more level open areas above the steep bluffs.

There is a shortage of adequate swimming holes. Small by-pass ponds could be created to overcome this handicap. Some sections of the bed of the creek could be periodically deepened. This deepening process would probably have to be repeated every season or two.

5. The Greenwood Multiple-Use Conservation Area

This suggested conservation area embraces a total of 711 acres of river valley lands on Duffin Creek extending south from Greenwood near Highway No. 7.

There are commercial parks at each end of this conservation area. Its southern margin adjoins Highlo Park and is near Cedar Glen Park. On its northern flank Greenwood Park stretches along both banks of Duffin Creek to the north of Highway No. 7. These commercial parks lie in some of the best recreation lands along this creek and at a future date the conservation area should be extended at either end to include them.

The area lies well beyond the present zone of active subdivision in Pickering Township and in the midst of an almost completely rural environment. There is a



GREENWOOD CONSERVATION AREA

LEGEND

- BOUNDARY
- WOODLAND
- GRAVEL PIT

SCALE FEET
1000 500 0 1000 2000



possibility of development of suburban estates and cottages in this part of the valley of Duffin Creek, which would increase the problems of acquisition in the future. This area is therefore recommended for early acquisition for the public.

(a) Description of the Property

At this point Duffin Creek flows through a deep but broad and open valley. The long slopes of the surrounding agricultural land lead gently down to the valley floor so that access to the river front is relatively simple at all points. The general setting, in the midst of a pleasant rural environment which is relatively free from urban encroachment, is very attractive and suitable for parkland.

Permanent streams (about two and a half miles in length), flow through the property. The waters are relatively shallow, varying from a few inches to three or four feet in the deeper holes. Sand and gravel bars are common along the meandering river. Because this stream frequently spills over a wide area of flood plain during the spring season, large sections of the valley are unsafe for permanent buildings of any type. Up to the present this section of Duffin Creek has remained relatively unpolluted and hence the waters are safe for bathing.

Approximately 250 acres or 35 per cent of the land surface is wooded. White cedar, is the dominant cover type of the area. Sugar maple and its associated species are also common. The black ash - white elm - red maple cover type, lies in a small poorly drained area alongside the road about a mile south of Greenwood.

Much of the woodlands lie in a belt along the river banks. The area therefore has an isolated and spacious atmosphere.

Little agricultural land will be retired from production by this development. Less than 5 per cent of the

total area is now cultivated. About half of the open land consists of riverflats and steep hillsides. These areas are used intermittently for pasture.

There are a number of buildings in this conservation area. A small barn situated on the north-east corner of Lot 12, Concession IV of Pickering Township is the only agricultural building within the proposed development. There are four cottages on the south side of the road between Concessions IV and V. Two of these, close to the riverbank at the bridge, are fairly large and in excellent condition. There are also a house and a cottage on top of the west side of the valley just south of the old railway line in Concession IV.

Midway down the western boundary there is a large gravel pit which is still in operation. This scheme does not necessitate a ban on further extraction from this pit. However, when the gravel supplies here are exhausted the site should be reforested and incorporated in this conservation area.

(b) Proposed Development

About 25 per cent of this conservation area should be reforested immediately and the existing woodland placed under a forest management program to ensure maximum yields. Most of the area to be planted to trees is now rough and bouldery weed-infested fields which are unsuitable for cultivation or pasture.

Many improvements could be carried out here at little cost. Most of the conservation area is enclosed by existing road allowances and Duffin Creek is already bridged at the north, south and central sections of the development. All that is required here is the construction of a series of short service roads to penetrate the area from various points along these road allowances. At the end of the service roads specific parking spaces should be laid out to control the

movement of cars in the conservation area.

North-south hiking trails should be cut through the area on both sides of the river. These trails could be linked at a number of points by foot-bridges.

As the river is too shallow for swimming it would be necessary to build one or more ponds for this purpose. By-pass ponds, which should be relatively simple to construct in some of the old meander channels of the streams, would be quite satisfactory.

Picnic tables and fireplaces must be set out at a number of points throughout the area. A central pavilion with a refreshment concession and toilet facilities would obviously be required.

6. Ajax Multiple-Use Conservation Area

This proposed development, embracing a total area of 390 acres, is situated on the lower reaches of Duffin Creek and extends from a point just below Pickering to the Lake Ontario shoreline. The area includes beach resources along the lakefront in addition to some superb potential riverfront parklands.

A large proportion of the land lies within the boundaries of the town of Ajax and is now under the jurisdiction of the Central Mortgage and Housing Corporation. The development plans for Ajax envisage a zone of parkland providing public access along its entire lakefront area. A small area of shoreline and river frontage at the mouth of Duffin Creek was placed under the jurisdiction of the Ajax Rotary Club for use as public parkland.

This recreation area, under the jurisdiction of the Ajax Rotary Club, has approximately 300 yards of sandy beach fronting Lake Ontario. There are about 5 acres of parkland to the rear of the beach and considerable well-shaded dry land here, but a large percentage of the five acres consists of marshland situated along the margins of Duffin Creek.

AJAX CONSERVATION AREA

LEGEND

- BOUNDARY
- MARSHES
- WOODLAND

SCALE FEET
0 500 1000 1500 2000
George K. Hume & Associates Ltd. Toronto & Ottawa and K. H. & J. M. Survey Maps



Attendance at this park, for which there is an admission charge of 50 cents per car, averages about 400 cars a day throughout the weekend holidays of the summer months. If this conservation area were developed, Ajax would then have the recreation areas along the lower course of Duffin Creek preserved as parkland and the rapidly increasing population of the surrounding region would be provided with badly needed playground space.

Until now this entire area has remained beyond the edge of urban subdivision. Hence there is an opportunity here to initiate a scheme slightly ahead of the advancing movement of population. The Conservation Authority could take full advantage of this desirable situation. Admittedly a large percentage of the land associated with this scheme is flood plain and marshland which should never be utilized as the site of permanent buildings. However, if the implementation of the scheme is delayed until urban development strikes these riverbanks, problems of acquisition will arise which will increase the cost of the scheme, create unnecessary disturbance to landowners and possibly result in a permanent loss of some of the most desirable upland recreation land. This area will not remain undeveloped indefinitely and hence the land should be secured as quickly as possible.

(a) Description of the Property

Here Duffin Creek meanders across a level clay plain in a broad, open, shallow valley. There is easy access to the riverbank at most points. The isolation and detachment from the surrounding landscape which was a feature of some of the previously discussed conservation areas is lacking here. Because there are few steep slopes the land will probably undergo rapid subdivision on the margin once the full force of urban development strikes it.

There is a well developed sand and gravel bar projecting from the eastern bank of the river at the mouth of



A very useful beach and picnic site in the proposed Ajax Conservation Area

A view of Duffin Creek winding through extensive marshes just north of its outlet into Lake Ontario.



The Lake Ontario beach for many miles east of the proposed Ajax Conservation Area is narrow, stony, muddy and often impassable. The waves wash against the cliff, which is about 20 feet high.

the creek. This bar contains about 700 feet of sandy shoreline along the lakefront and offers the best beach area between Frenchman Bay and the eastern boundary of the watersheds. There is very little bar development on the western side of the creek. Here, however, a large sand and gravel deposit lying a few feet below the surface of the water extends for about one thousand feet into the lake. At the time of this survey a sand and gravel company had installed a dragline and conveyor belt to remove the gravel from this underwater deposit.

Immediately to the east and west of the river mouth the shoreline of Lake Ontario is rimmed by a line of cliffs which rapidly increase in height. In recent years these clay cliffs, which are very susceptible to undermining by the pounding of the lake waves, have undergone a fairly rapid recession at many points.

Within this conservation area the river winds for a length of about three miles. In its lower course Duffin Creek, here a broad and fairly deep stream, wanders through extensive marshlands covering the entire valley floor and stretching for about a mile to the north of the lakefront. Large patches of open water are common in the midst of this marsh, and the stream frequently changes its course.

Only 10 per cent of the area is now woodland, chiefly in small isolated patches. The cover types of tree species are shown on the Forest Conditions map in the Forestry section of this report.

About 80 acres of land on the east bank of the creek in Ajax is now devoted to the growing of corn. The remaining open area of river valley flats consists of unimproved pasture and idle fields with many weeds.

On the east bank of the creek a new sewage plant for Ajax is now being constructed. The development should not interfere with the successful operation of this

scheme. When the grounds are properly landscaped they should blend satisfactorily into the surrounding park area. Moreover, this plant will ensure that pollution from Ajax will be reduced to a minimum. When the situation in Pickering Village is remedied, the polluted condition of the creek at certain seasons of the year should be entirely overcome.

(a) Proposed Development

There are no permanent buildings to be acquired within this conservation area. The land within the Ajax development, which forms over 80 per cent of the total area involved, should be secured by agreement with the Central Mortgage and Housing Corporation. In this connection it should be noted that a satisfactory arrangement may be made to secure this area at a minimum of cost to the R.D.H.P. Authority. It would be necessary to purchase the remaining land from private owners.

About 30 per cent of the land should be reforested immediately upon acquisition. This would provide the site with sufficient woodland cover to create the necessary atmosphere of isolation and detachment which is conspicuously lacking at the moment.

There is a series of marshes in the valley between Highway No. 401 and the mouth of the river. Some of these marshes are of exceptional interest to naturalists since they harbour great numbers of migrating wildlife and furnish cover and breeding or wintering sites for several rare species of other birds. The marshes are numbered from 1 - 5 on the accompanying map. If it is necessary to use any of these marshes for dumping fill the only areas where fill should be placed would be in marshes Nos. 1 and 5. Otherwise wildlife will be seriously disturbed if not driven away entirely.

No. 1 marsh is very small and lies immediately behind the present sandbar. It could be filled with little effort. This might strengthen the sandbar and create

additional usable land at a strategic point.

No. 5 marsh is a large area of about 20 acres which is relatively dry. If necessary some part of this area could be filled, provided that heavy machinery is used to compress the material. The above comments are made because there is a heavy demand for dumping outlets in the region. Marshes Nos. 2, 3 and 4 are of importance to wildlife and marsh No. 4 provides some of the most spectacular scenes, during migration, in this part of Ontario. It should under no circumstances be altered.

There is a very unsightly dump already located as shown on the map. This should be compacted, covered with soil and the area screened from public view.

In the rest of the conservation area the usual picnic tables, fireplaces and other recreation facilities would be installed. A boat rental service at the mouth of Duffin Creek would probably be heavily used.

7. Cedar Grove Conservation Area

The proposed large-scale Conservation Areas and Public Beaches will eventually supply recreation facilities for regional as well as smaller urban and rural communities. They include the choicest and most vital of the large areas suitable for playgrounds on the R.D.H.P. Watersheds. However, they do not exhaust the recreation value of these river basins. There are still many miles of valley lands which, although they are less spectacular, have resources of a very high order from the point of view of community recreation.

Many of the villages and towns of the watershed lie alongside a section of riverfront. These valley areas, which are often unsuitable for permanent buildings due to their susceptibility to floods, form a valuable source of potential community parklands and in some instances should be the central core of their public park system. Sometimes old

mills and other points of historic interest which are worth preserving and restoring lie close to or within these areas. Such features have both an educational and recreational value and therefore should naturally be available to the public.

In this report the establishment of a local conservation area in the rural community of Cedar Grove is discussed. While the scheme is designed primarily to satisfy the requirements of the neighbouring communities, the recreation area would undoubtedly be used by people living much further afield. The preservation of the significant historic buildings and sites within the area is certainly of importance to the R.D.H.P. Conservation Authority. Hence the participation of the Authority in this local development program is fully justified.

This conservation area embodies about 255 acres of river valley lands along the Little Rouge Creek in the immediate vicinity of Cedar Grove. The proposed development is situated a little less than two miles south of Highway No. 7 at Locust Hill.

Cedar Grove, one of the earliest of the nuclei of pioneer settlement in Markham Township, is one of the most interesting rural communities in the R.D.H.P. Watersheds. There are a number of historic buildings and sites within the area included in this scheme. The preservation of these historic monuments and their opening for public inspection would be an excellent program for the Authority to support.

This hamlet and the group of prosperous farmlands surrounding it still have an interesting folk culture and community spirit in the face of outside urban influences which have led to the complete disintegration of these features in many similar rural areas in Southern Ontario. Exponents of rural sociology have long advocated that definite steps be taken to foster the re-development of the social and cultural life of the rural community.

Here the local residents have maintained community coherence and distinctiveness through their own efforts. It would seem advisable for the Authority to help to maintain these conditions wherever possible.

This local community spirit finds one of its clearest manifestations in the activities of the "Community Club". Through the medium of this club the residents have already achieved considerable success in the field of community recreation. They now need assistance to enable them to preserve the historic sites of their community, which are among the most important in the R.D.H.P. Watersheds.

The scheme is designed to satisfy the requirements of this community. The residents appear to be willing to co-operate fully with the Authority in this development program, which will obviously be beneficial to them and to the people of the Authority as a whole.

(a) Description of the Property

At this point the valley of the Little Rouge Creek is of sufficient breadth and depth to offer a fairly extensive area of valley flats which are distinctly detached from the surrounding agricultural lands. However, there is no repetition of the grandeur of valley form which was so prominent a feature of the Rouge River Conservation Area to the south. Here the valley floor varies from 50 to 75 feet below the level of the cultivated fields on its flanks and there is relatively easy access to the river bank at most points. Broad, open flood plains which could be easily converted to excellent playing fields and picnic grounds are a noticeable feature of the northern segment of the proposed development.

There are approximately two miles of river frontage in the conservation area. This section of the river, varying from a few inches to a couple of feet in depth, is too shallow for swimming throughout its entire length. However, the local residents do bathe in a somewhat deeper

part just south of the bridge on the northern boundary of the area. Sand and gravel bars are frequently encountered in the river bed and often result in picturesque sections of fast, sparkling water.

About 127 acres or 50 per cent of the total area is woodland. Three major cover types, namely white cedar, white elm and beech - sugar maple, occur in this section of the river valley. White cedar is the dominant species. Most of the white cedars are from 4 to 10 inches in diameter. White elm, varying from 10 to 18 inches in diameter, occupies about 39 acres of the lower valley lands. The beech-sugar maple association occupies about 18 acres. The trees of this group fall within the 4 - 10 inch diameter class.

Several years ago the Community Club built an outdoor ice-skating rink on the river flats adjacent to Cedar Grove. An excellent pavilion was constructed to provide accommodation for putting on skates and serving refreshments. This rink is extensively used by the local residents and is also rented by outsiders for hockey practices.

Close beside this rink, an open-air theatre has been constructed. Here there is a roofed and aluminum-sided outdoor stage of a good size. The level river flats fronting the stage are capable of seating a large number of people on portable benches. Beyond these flats the steep bank has been cleared and turfed to some extent to provide room for a larger audience. The yearly garden party and variety show held in this open-air auditorium annually attracts more than 1,500 people. These facilities are located on private property lent to the Community Club for this purpose. Hence the club has no security of tenure.

This group is now considering the establishment of a small museum in the old blacksmith's shop situated on the east side of the road just south of the bridge across the creek at Cedar Grove. The building is not particularly impressive

from the exterior, but the interior needs only a little clearing up to be a museum piece itself. If the forge, anvil, wheelform, workbench and hand-made tools are left in place, they would provide an excellent means of acquainting both children and adults with the life of the remote past. There would be sufficient space in the roomy loft of this shop to exhibit sleighs, broad-axes, scythe-cradles, yokes and so forth, now scattered in various homes throughout the community.

The Peter Reesor house, a stone structure built somewhere between 1830 and 1832 by the first settler in the community, stands high above the valley on the west bank of the river. This house faces towards the valley and is approached from the north by a private lane leading from a concession road to the north. This lane, together with the section leading down the bank to the Peter Reesor mill site in the valley below the house, forms part of the old settlers' road which replaced the Rouge Portage Trail. The house is situated somewhat back from the rim of the valley and the view downstream is partially obstructed by the surrounding woodland cover. If the trees were judiciously thinned, this house and its adjacent grounds would command a wide view of a beautiful section of river valley lands. The outline of the old garden plan is still discernible and could be restored without much trouble.

The large and roomy structure is an excellent example of a "Pennsylvania Dutch" type of farmhouse. One wing of the building has been torn down but the main structure stands intact and requires little work to restore it to its original appearance. The house could serve as a museum in which many of the relics of pioneer crafts could be kept. At the present time there are a number of valuable collections assembled in some of the private homes of the community. Some of these relics could be borrowed for this museum on a "permanent loan" basis.

Just to the north-east of this house there is an old frame barn standing on a stone foundation. The barn was built in 1831, as indicated by the date cut in the south gable. This barn is constructed with a cantilever overhang, characteristic of the "Pennsylvania Dutch" type of design. The barn could serve as a place of display for the larger types of farm implements and vehicles, similar to the collection already successfully established by the Humber Valley Conservation Authority at the Dalziel Pioneer Park.

At the moment the Peter Reesor house is occupied by tenants. The barn is used by a member of the Reesor family who farms surrounding lands. If arrangements could be made to make these buildings accessible to the public, they would, with their surroundings, make a most attractive group.

In the southern section of the conservation area to the east of the side road leading through Cedar Valley, the Community Club have converted the "old log yard" into a first-class playing field. The land was made available to the Community Club by the owner on the condition that it be used for recreation purposes and not subdivided and used for homes or commercial purposes. The land was drained, levelled, seeded and fenced by volunteer labour organised in a series of community "work bees". Here we have another example of the splendid community spirit of the Cedar Grove area.

(b) Proposed Development

This development would be of a somewhat different nature than those previously discussed. There are two distinct aspects involved here, namely the provision of outdoor recreation facilities and the preservation of historic buildings and sites. Moreover, there is an active community organization in Cedar Grove which is able and willing to assist in the establishment of the development and in its necessary maintenance.

In the case of the historic sites and the existing community recreation facilities falling within the conservation area, such as the outdoor theatre and skating rink, the part played by the Authority could be that of ground landlord and sustaining member. The direction could be left with the local community club with the right to admit the general public to the use of the facilities as they saw fit.

Picnic tables, playing fields and hiking trails should be laid out on the remaining valley lands which constitute the largest area of the development. Small dams could be constructed at any of several points for the provision of swimming facilities. These, of course, would be open to the general public at all times as well as to the local residents of the Cedar Grove community. Undoubtedly, the members of the club would assist in supervising and maintaining these areas in a satisfactory condition.

This form of co-operative venture between the R.D.H.P. Authority and the Cedar Grove community should serve to preserve the solidarity and community spirit of the area and at the same time enable the Authority to accomplish a worthwhile development with the minimum cost and effort.



A part of the fine sandy beach proposed for public acquisition at Frenchman Bay. This beach is the best shoreline recreation resource in the R.D.H.P. Watershed. This section is in Compartment A (referred to in the text) looking westward, where the beach between the lake and Frenchman Bay is narrowest.



A sign and fence restricting the use of the fine beach of Lake Ontario at Frenchman Bay. The only area now freely open to the public is the beach at the road allowance—a total length of approximately 66 feet.

CHAPTER 4

PUBLIC BEACHES

There is already a very great demand for public beaches in the stretches of Lake Ontario's shoreline fronting the R.D.H.P. Watersheds. This demand is growing and will intensify in the near future.

This chapter includes two steps which might be taken to satisfy the present and future needs. The first step is that the few natural beaches which are suitable for public use should be secured for the public without delay. The sites are described and they are shown on the accompanying map. Two of the beaches (at the mouths of Duffin Creek and the Rouge River) have already been discussed in connection with two river valley parks with which they are closely connected.

The second step is that public access should be obtained to as much of the shoreline as possible and as much freedom of movement along it as possible should be arranged. The fact that the cliffs are rapidly eroding provides an additional reason for restricting the building of apartments or houses near their edge. The safe distance would, of course, vary from 200 to 500 or more feet. The ideal situation would, of course, be public ownership of a strip of land above the cliffs as well as of the foreshore below. Certainly beach areas should not be blocked off as private property, as has been allowed to occur in the past.

Constant attention must be given to the future subdivision trends in the whole area because it may prove advantageous to establish additional lakefront parks on top of the cliff areas even though they do not possess satisfactory beaches. The lakefront recreation resources are of such immense significance both for Pickering and Scarborough Townships, and for the whole Metropolitan area, that they must not be needlessly squandered. They must be carefully planned and secured before subdivision can take place.

1. The Port Union Beach

This beach lies along the Lake Ontario shoreline eastwards of the boundary between Pickering and Scarborough Townships at Port Union. The area is located just over a mile and a half south of Highway No. 401 and is directly accessible over a tarmac-surfaced road leading to its western extremity. A gravel sideroad leads to its eastern margin.

At the present time this stretch of beach at the foot of the road allowance at Port Union is extensively used by the local residents and by many visitors from the Toronto region. Unfortunately only a few hundred feet of the shoreline are available to the public, as the area eastward of the railway station has been posted by cottage owners against trespass.

(a) Description of Property

As indicated on the accompanying map, the development includes a narrow strip of land lying between the railway tracks and the beach. The total area involved is approximately 7 acres and includes beach, shoreline cliff and some flat upland area.

Here there is approximately 700 yards of beach of varying quality. At the western end it is between 30 and 50 feet in width and contains a high percentage of sand. The eastern half is much narrower, being 15 to 25 feet in width, and the gravel content is much higher. Westward of the Port Union sideroad the beach rapidly narrows and increases in stone content. At one point, where rocks have been placed along the C.N.R. embankment to protect the rail bed from threatening erosion, the beach has been entirely obliterated. Thus this lakefront development is entirely separated from the proposed Highland Creek Conservation Area.

This is a poor beach compared with the sandy bars of Frenchman Bay or some of the best beaches of the City of Toronto. Much of it is too narrow and too stony in content. It is also subject to drastic changes in structure at frequent intervals. In periods of storm the waves of the lake roll

across it to the base of the low clay cliffs in the rear and often leave gravel and silt deposits over what were formerly good sand beaches. Nevertheless, accessible sand beaches are so scarce in this region that those associated with this development assume a considerable importance in any recreation plan for the R.D.H.P. Watersheds.

The cliffs immediately behind the beach rise from about 10 feet in height in the vicinity of Port Union to approximately 25 feet at the eastern margin of the area. However, access to the shoreline is relatively simple at a number of points and in some places grassed slopes lead directly to the sandy beach. There has been considerable erosion along much of this cliff due to the higher lake levels of recent years.

Above the cliffs there is approximately 100 feet of level land at the eastern end of the area. This tapers to a few feet at Port Union. In the broader parts of these flats above the cliffs there would be some room for parking and playing fields. However, parking facilities should also be provided in a triangular piece of land on the north side of the railway tracks at the eastern end of the area.

There are a number of cottages and houses on this property at the moment. However, due to shoreline erosion the existence of some of these buildings is precarious. The house lying to the west of the railway station has already been seriously undermined and is now abandoned. The station-master's house does not appear to be in any immediate danger. The nine small cottages in the eastern section of the proposed development are likewise not likely to be lost, but there will certainly be a continued erosion in the cliffs fronting them so that access to the beach down the sheer cliff will continue to be a problem. Any type of permanent steps down the cliff would probably be washed away in the spring and winter.

The railway tracks running along the rear of this area present a serious problem. The movement of people across railway lines, especially children, always creates hazards. However, at the moment there is a level crossing over the track to provide access to the buildings lying within this proposed public beach area and to the more dense cottage development to the east. At present, people using the beach at Port Union park their cars at the foot of the road and walk across the tracks to the beach on the other side.

(b) Proposed Development

An elaborate development of this beach area is not recommended at the present. The somewhat vulnerable nature of the beach and cliffs does not warrant the spending of large sums of money for installations. What is required here is simply to open to the public a stretch of greatly needed beach which is of a reasonable quality. Moreover, the menace of erosion makes it advisable to prevent the further development of cottages near the edge of this line of cliffs.

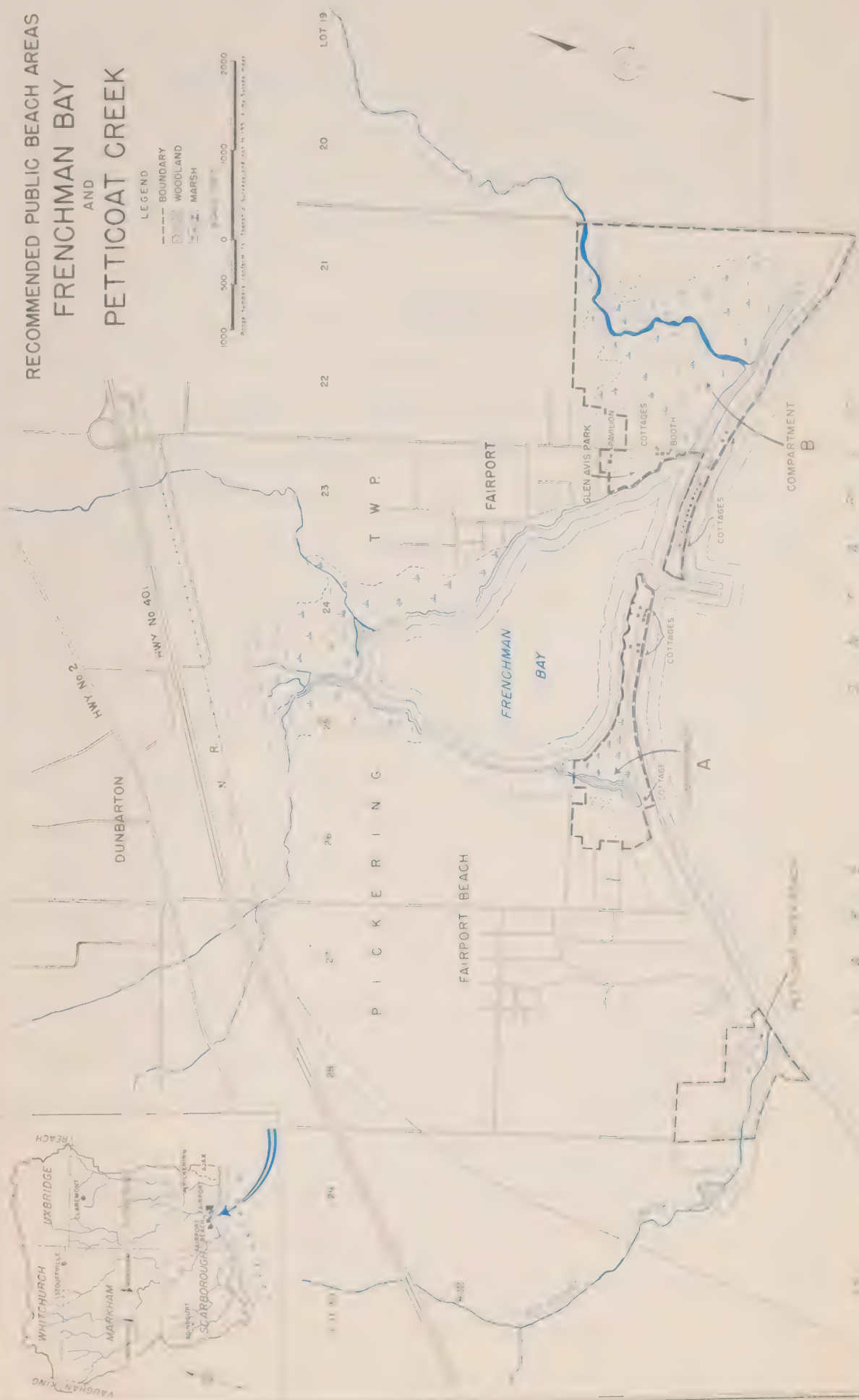
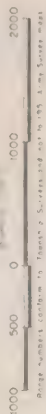
The first step in the inauguration of this development would involve the purchase of all open land within the area and the opening up of the beach to public access throughout. There should then be a progressive purchase and removal of all private buildings on the site over a period of time.

2. Petticoat Creek Beach

This suggested development is situated at the mouth of Petticoat Creek just to the west of Fairport Beach. At the present time there is no direct road to the shoreline at this point. A gravel-surfaced road leading south from Highway No. 401 ends just north of the steep-sided valley of Petticoat Creek about a mile from the lakefront. However, motorists frequently park their cars at the end of this road and walk along the edge of the valley to the lakefront in spite of the "No Trespassing" signs posted along the route. The

RECOMMENDED PUBLIC BEACH AREAS FRENCHMAN BAY AND PETTICOAT CREEK

LEGEND
 --- BOUNDARY
 [Symbol] WOODLAND
 [Symbol] MARSH



bottles and papers that strew this well marked footpath clearly indicate that the area is frequently used for picnic purposes.

(a) Description of the Property

The total area involved in this scheme is approximately 25 acres and includes a section of the lower part of the valley of Petticoat Creek in addition to the beach strip across the valley mouth.

The beach, approximately 800 feet in length, is composed of an unbroken sandbar, which stretches across the mouth of the creek, and small sand and gravel deposits abutting the side walls of the valley on the lakefront. Since Petticoat Creek has little or no flow in the summer months, the sandbar is not pierced by a permanent and well marked watercourse. The sand deposits here make an excellent beach.

To the north of the bar, most of the valley floor is marshland. However, the high sandy valley walls, which are heavily wooded in most cases, offer well shaded upland footpaths. About 16 acres or 65 per cent of the total area may be classed as woodland. On the northern slopes of the valley the dominant cover type is beech - sugar maple, which is frequently interspersed with white pine, red oak and ironwood. The woodland cover of the southern valley wall is mainly white pine and hemlock with a frequent occurrence of red oak, hard maple and beech. The larger trees are about 18 inches in diameter and very useful for shade.

About 10 acres of the property is rolling open fields leading away from the steep wooded slopes of the valley. This area is now unimproved pasture and idle land.

There are no buildings of any type on the property recommended for acquisition in connection with this scheme and therefore the land price should be low.

(b) Proposed Development

It will be necessary to construct a road through this property on the north side of the creek in order to provide easier access to the lakefront. However, it will not be necessary to bridge the stream.

Hiking trails, picnic tables and fireplaces can be set out at various points on the beach and in the valley to the north. Parking facilities can be developed at a number of points.

About 30 per cent of the total area involved in this development should be planted to trees.

It should be noted that it would be advisable to proceed with this scheme almost immediately. Cottage and home developments at the western end of Fairport Beach will probably encroach upon the area very shortly. This will make it very expensive to attempt to implement the scheme at a later date. Because the road has not been driven southwards to the lakefront the area has not been developed for cottage sites up to the present time, but the land will be subdivided if it is not soon acquired for the public.

3. Frenchman Bay Beach

The beaches associated with the sand and gravel bars fronting Frenchman Bay are unquestionably the finest shoreline recreation resources in the R.D.H.P. Watersheds. The waters of the bay are well protected and there is easy access at all points. The beaches are equal to the best available in the entire western end of Lake Ontario. There has therefore been an extensive cottage development surrounding the bay.

Because of the size and quality of its resources, this bay should be prominent in any plan for recreation activities of the rapidly expanding urban developments to the east and west. Even if the area is partially used in the future for industrial and commercial developments, its beach resources could and should be developed for public



A part of the fine sandy beach proposed for public acquisition at Frenchman Bay. This beach is the best shoreline recreation resource in the R.D.H.P. Watershed. This section is in Compartment A (referred to in the text) looking westward, where the beach between the lake and Frenchman Bay is narrowest.



A sign and fence restricting the use of the fine beach of Lake Ontario at Frenchman Bay. The only area now freely open to the public is the beach at the road allowance—a total length of approximately 66 feet.

parkland. Large and continually increasing crowds already visit this area at week-ends looking for public parks.

There is now ample need for the proposed developments. With increasing demand, land values will certainly rise. The acquisition of publicly owned parks here is therefore an urgent necessity.

(a) Description of the Property

When eventually completed in full this scheme would result in 5,500 feet of public beach facing Lake Ontario. About 3,000 feet of this would also offer access to the waters of Frenchman Bay. The western bar enclosing the bay possesses excellent sand beaches approximately 100 to 200 feet in width. However, this bar is low and subject to periodic flooding in periods of high water. Hence it is not entirely safe for permanent buildings. The eastern bar across the mouth of the bay also has some good beach areas but the gravel content appears to be somewhat higher. The long stretch of gravel bars enclosing a marsh and open water area immediately to the east of the main bay also contains beaches suitable for public recreation.

At the western end of this development an open slope of hilly land, which has not yet been subdivided, has been included in the scheme. This would provide the necessary parking and entrance facilities for the beaches of the western bar. Another piece of ground at the eastern end of the area would play a similar role for the eastern bar. The marsh land and lagoon area to the east of the main bay could be put to a variety of uses and should be acquired if more parkland is required.

The west bar now contains six cottages on its eastern extremity. The ruins of other summer properties can be seen at various points along this bar. The beach area is certainly unsafe for permanent buildings over most of its length. There are about 16 cottages located on the eastern bar. Access is gained to these along a service road from which the general public is excluded.

Glen Avis Park on the banks of Frenchman Bay and Sandy Beach Park fronting the marsh to the east of the bay have been included in this scheme. These commercial parks are now heavily utilized and should continue to be used for recreation purposes.

(b) Proposed Development

From the point of view of timing and procedure of acquisition and development, the public beach area can be separated into two compartments. Compartment A includes the west bar fronting the bay and a section of the adjoining mainland. Compartment B embraces the east bar, a section of marshland to the east of Frenchman Bay, and Glen Avis and Sandy Beach Commercial Parks.

Compartment A is the logical area to develop first. It would greatly relieve the pressure in this area for public bathing facilities. Its acquisition would also involve a minimum of disturbance to existing property holders.

This compartment would form a complete operating unit in itself. The lakefront beach, about 2,000 feet long, would provide facilities for several thousand people. There is enough high open land available at the western end of the bar for the construction of permanent buildings, entrance and parking facilities, and for the safe storage of movable equipment in the winter season.

At the moment there are 9 cottages situated on the eastern extremity of the bar. These would have to be purchased and removed over a period of time. There are no other buildings within this compartment.

It would be necessary to construct parking facilities on the site. Picnic tables and fireplaces should be laid out along the beach. A bathing pavilion would obviously be required. The provision of boat rental facilities would probably prove very popular. In this connection it should be noted that boating would be possible

both on the open lake and within the bay. Hence periods of relatively rough water on Lake Ontario would not affect business at most times because the more protected waters of Frenchman Bay would be available. Arrangements would have to be made for a lifeguard service and beach patrol.

Compartment B of the park presents a different problem and requires a somewhat different approach. There are 16 cottages on the eastern bar to the west of the main road leading to Frenchman Bay. At the moment the public is prevented from gaining access to this stretch of beach along a private road serving the cottages. There is a refreshment concession and two cottages just to the east of the main road. Glen Avis Park is a fairly extensive development with a number of substantial permanent buildings. Sandy Beach Park has an excellent beach which has been considerably improved over a period of time. However, it is not necessary to purchase these properties immediately. The development of compartment A of this beach area should relieve the demand for public recreation space for the moment. What is necessary is to safeguard Compartment B for development at a future date. To do this it is necessary to ensure that no development takes place here which is detrimental to future use planned for the area. No further cottage construction should be permitted within this area and the two commercial parks should be kept intact as recreation land. Whenever a property is offered for sale, whether it be a cottage or a piece of open land, it should be purchased for the public, and reserved for development as beach and parkland. This would appear to be the only sensible way to approach the scheme with respect to Compartment B.

GOVT PUBNS

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